THE IRON TRADE REVIEW

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First Half Ends With Tendency Upward

Heavy Sales of Forge Pig Iron—Some Structural Mills Well Supplied With Orders—Good Sized Contracts for Coke.

The first half of this year, like the same period of last year, has been disappointing, but closes with more improvement than was noticeable a year ago. While the change for the better is not uniform or very decided, a larger tonnage is moving, and mill activities are gradually increasing. The mills of the United States Steel Corporation are now running at the best rate this year, with the exception of a short period in March. Its mill activity is now about 68 per cent, and blast furnace operations remain at about 63 per cent. One large company reports that its bookings of rails and crude steel show a gain of from 40 to 50 per cent in June as compared with May.

Pig Iron

The heaviest purchases of pig iron made during the week were by a large eastern buyer, which has closed with New York state furnaces for from 20,000 to 25,000 tons of standard mill forge for delivery over the remainder of the year. A Massachusetts buyer has purchased from 6,000 to 8,000 tons of No. 2X and special foundry grades for last half, the business going to Buffalo and eastern Pennsylvania makers at low prices. Buffalo is still the center for lowest prices in foundry grades. The Union Radiator Co., Johnstown, Pa., has purchased from 5,000 to 6,000 tons of No. 2 foundry from a nearby furnace, and another radiator company at Johnstown is understood to have practically closed for 3,000 tons.

Structural Material

Increased tonnage that has recently been placed in structural lines is reflected in the position of some of the larger fabricating interests, which now are not able to promise deliveries under two or three months. These companies, as a consequence, are coming to a situation where they are practically out of the market on smaller work or on contracts in which quick deliveries are of first importance. On the larger sized work, the competitive position has not been affected. A fair number of structural contracts have been placed during the week.

Export Business

Export business in iron and steel products continues at a record-breaking gait. The half year business of the United States Steel Products Co., the export subsidiary of the United States Steel Corporation, will approximate 1,000,000 tons, which is at the rate of a one-third increase over the tonnage of the two preceding years. A notable feature of the export trade at present is the heavy demand for corrugated galvanized sheets, principally from South American countries. Orders have been placed with the United States Steel Products Co. for about 3,000 tons of this product for shipment to Argentine Republic and to Chili. One order for about 2,000 tons is included in this business. The Mexican Northwestern railroad has placed several thousand tons of steel wheels and axles, and another Mexican line 3,000 tons of rails with the leading export interest.

Railroad Buying

While the attitude of the railroads toward purchasing is somewhat more encouraging, it is not expected that there will be any important increase in rail business until after the ending of the fiscal year, June 30. The American Bridge Co. has taken contracts for 4,000 tons of bridge material for the B. & O., and 3,800 tons for the Louisville & Nashville. The Southern railroad is in the market for 20,000 tons of steel rails. The Northern Pacific has ordered 500 steel underframes, and the Great Northern 1,000 box cars. The Erie will purchase 4,000 freight cars of various descriptions.

Wages

The adjustment of the wage scale is proceeding satisfactorily. The independent sheet and tin plate manufacturers and the Amalgamated Association have reached an agreement on the wage scale for the year beginning July 1, and the Republic Iron & Steel Co. and the Amalgamated Association have re-affirmed last year's bar iron scale. Other companies have not yet taken action.

Coke

Contracts for furnace coke closed in the Pittsburg district for the last half of the year amounted to 250,000 tons. A New Jersey smelting interest has contracted for about 15,000 tons of furnace coke for the full year. The Latrobe district makers are quoting about $1.60, ovens.

Sheets

The sheet market is firmer, and numerous contracts have been made. Valley sheet makers are usually quoting on a basis of f. o. b. mill instead of Pittsburg. Some of the independent sheet manufacturers are operating to capacity. Liberal specifications are being received by tin plate manufacturers. The merchant pipe market is not very active.

WORLD'S IRON MARKETS

PITTSBURG

Contracts for Furnace Coke—Sales of Pig Iron Not Large.

Office of THE IRON TRADE REVIEW,
2148-49 Oliver Bldg., June 27.

The first half of the year closes with new orders and specifications in some branches of the local iron and steel trade, notably structural steel, sheets and rails, coming in at a more satisfactory rate than at any time for several months. However, prices of billets, sheet bars, steel bars, bar iron, sheets, plates, structural steel and shafting are from $1 to $4 a ton lower than at the beginning of the year. The market as a whole has shown a steady improvement since early in June and at least one or two large steel companies are operating practically to capacity this week. One company reports that mill orders for rails and semi-finished steel this month will show a gain of from 40 to 50 per cent over May and some sheet manufacturers report that bookings in June have been heavier than for any single month in more than a year. Sheet and tin plate manufacturers have renewed the 1910-1911 wage scale, and this is regarded as an indication that manufacturers of sheets look for a still further improvement and higher prices, as today's prices are from $4 to $5 a ton lower than a year ago, when the present scale was signed. A number of mills will close down for a brief period beginning June 30.

Contracts for furnace coke involving upward of 250,000 tons for last half shipment were closed by local sellers during the week and the market has been pretty well established at from $1.65 to $1.75, ovens, for delivery over the next six months. A large portion of the foundry coke tonnage for this period has also been closed. Prices on foundry coke are not very firm. There is considerable inquiry for pig iron, but sales have not been very heavy. Middlemen have sold small lots of Bessemer at slightly under $15, valley.

The lower prices on wire products announced last week have resulted in a number of contracts being made for last half, but specifications are not very heavy. Structural lettings during the week include 4,000 tons of bridge material for the Baltimore & Ohio railroad, 3,800 tons of bridge material for the Louisville & Nashville railroad and 14 government barges involving 1,700 tons of steel, placed with the American Bridge Co.; 1,500 tons for an addition to the St. Louis plant of the Fulton Iron Works, awarded to the Riter-Conley Mfg. Co., and several other small contracts placed with local mills. The embargo against shipments of scrap has been extended to cover all consumers at Monessen, Pa., as well as some of the steel mills down the Ohio river.

Pig Iron.—Pending inquiries for pig iron for prompt and last half delivery involve heavy tonnage in the aggregate. While some iron has been bought quietly, no particularly large sales are noted. It is believed, however, that more iron has changed hands since June 1 than has been made public, and in some quarters these transactions are regarded as an indication of price concessions. Trading during the past week has been chiefly for foundry grades. One seller reports having sold between 3,000 and 4,000 tons of No. 2 foundry iron in small lots on a basis of $13.50 to $13.75, valley, for prompt and last half shipment. The Union Radiator Co., Johnstown, Pa., has purchased between 500 and 600 tons of No. 2 foundry iron from a nearby furnace, and the National Radiator Co., Johnstown, is understood to have practically closed for 3,000 tons for third quarter shipment. A local sanitary interest has also taken some northern foundry iron for its western Pennsylvania plants, although the exact tonnage involved is not known. Pending inquiry for foundry grades involves several lots of from 500 to 1,000 tons each. A local company which recently inquired for about 500 tons of gray forge is reported to have closed for moderately heavy tonnage for last half shipment. The Pennsylvania Railroad Co. is taking bids on a round tonnage of foundry and charcoal iron for its shops east of Pittsburg. No important sales of basic have been reported, although there is moderately heavy tonnage under active negotiation. This market has not been thoroughly tested and $13.25, valley, is regarded as the general asking price of furnaces for prompt and last half shipment. A local steel casting interest has closed for 250 tons of Bessemer pig iron for prompt shipment at slightly under $15, valley. The iron was sold by a middleman. Furnaces will not quote below $15, valley, this price having been in effect since August, 1910. Another local consumer is reported to have taken 100 tons of Bessemer at about $14.85, valley, and is in the market for a larger tonnage. We quote the market as follows:

(Prompt Shipment.)

Bessemer, valley	$15.00
Bessemer, Pittsburg	15.90
Basic, valley	13.25
Basic, Pittsburg	14.15
No. 2 foundry, Pittsburg	14.40
Gray forge, Pittsburg	13.90
Malleable, Pittsburg	14.15

(Third Quarter.)

Bessemer, valley	$15.00
Bessemer, Pittsburg	15.90
Basic, valley	13.25
Basic, Pittsburg	14.15
No. 2 foundry, Pittsburg	14.65
Gray forge, Pittsburg	13.90
Malleable, Pittsburg	14.15

Ferro-Alloys. — Demand for ferro-manganese is light and purchases are confined to small lots. A local interest has closed for 200 tons at $36.50, Baltimore. All large users of 50 per cent ferro-silicon are covered by contract and there is little inquiry pending.

We quote ferro-manganese at $36.50 to $36.75, Baltimore, for prompt and forward delivery. The freight rate from Baltimore to Pittsburg is $1.95 per ton.

Fifty per cent ferro-silicon is quoted at $52.75 to $53.75, Pittsburg, for prompt and forward delivery; 12 per cent, $25; 11 per cent, $24; 10 per cent, $23, f. o. b. Jisco and Ashland furnaces. The freight rate to Pittsburg is $1.90. The foreign grades are held at $1 or more a ton over domestic prices.

Plates.—Specifications against contracts for plates are moderately heavy and a fair volume of new business is under active negotiation. Plate mills are operating on a slightly better schedule and the indications are that the market will show further activity next month, when, it is expected, definite action will be taken on car inquiries and other proposed new work being figured upon. It is conservatively estimated that tenta-

tive inquiries for 10,000 cars are pending and it is known that other roads are quietly figuring on additional equipment. The inquiries of the Baltimore & Ohio and Louisville & Nashville railroads for 1,000 steel underframes each likely will be acted upon within the next few days. The Pressed Steel Car Co. is building 12 street cars for the United Traction Co., Albany, N. Y. Other transactions involving fairly heavy tonnage of plates, outlined recently, are still pending. We quote the market as follows:

Tank plates, ¼ inch thick, 6¼ to 100 inches, 1.35c. Extras are as follows, per 100 pounds: Boiler and flange steel plates, 0.10c; A. B. M. and ordinary firebox steel plates, 0.20c; still bottom steel, 0.20c; marine steel, 0.40c; locomotive firebox steel, 0.50c; all sketches excepting straight taper plates varying not more than 4 inches in width at ends, narrowest end being not less than 30 inches, 0.10c; circles, 0.20c. Plates in widths over 100 inches up to 110 inches, 0.05c; over 110 inches up to 115 inches, 0.10c; over 115 inches up to 120 inches, 0.15c; over 120 inches up to 125 inches, 0.25c; over 125 inches up to 130 inches, 0.50c; over 130 inches, 1c. Gages under ½ inch to and including 3-16 inch plate on thin edge, 0.10c; under 3-16 and including No. 9, 0.25c. Five cents extra for less than carloads. Terms net cash in 30 days.

Sheets. — Low prices on sheets, which became effective June 1, have brought out exceedingly heavy tonnage, and, in point of new orders and specifications, this market has made a better showing in June than in any single month in more than a year. Some of the independents are operating to capacity, although others are not operating at more than from 60 to 80 per cent. The operating schedule, however, does not reflect true market conditions, as manufacturers have been carrying extremely heavy stocks. The American Sheet & Tin Plate Co. is operating more mills than for several months. Prices are firm and some mills will not quote today's prices for delivery very far ahead. We quote the market as follows, with $1 a ton added as the delivered price in the Pittsburg district:

Blue annealed sheets No. 10 gage 1.50c; black annealed sheets No. 28 gage 2c; galvanized sheets No. 28 gage 3c; painted roofing sheets 1.40c per square for No. 28 gage, 2½-inch corrugation; galvanized roofing sheets 2.55c per square for No. 28 gage, 2½-inch corrugation, f. o. b. Pittsburg.

Tin Plate. — Liberal specifications against contracts for tin plate are being received by local mills. Some of the independents are running full time and the American Sheet & Tin Plate Co. is operating on a more satisfactory schedule. While there is not a great deal of new business appearing, several of the large consumers, who some time ago covered for second and third quarter requirements, have requested that these contracts be extended to cover the last three months of the year at today's price. We quote the market as follows:

Coke tin plate, 10-pound basis, 14 x 20, $3.70 f. o. b. mill, Pittsburg district.

Rails and Track Material.—Specifications against contracts for standard steel rails during the past week and for the month to date show a decided gain as compared with the corresponding periods in May. Some companies report a gain of almost 50 per cent in orders entered in mill books for the first 26 days of this month, as compared with the same period last month. Several trunk lines have taken practically all the tonnage involved in rail orders placed early in the year. Shipping directions this month indicate that some sections of these roads are sadly in need of repairs, and a few of the large eastern transportation companies are expected to place additional orders for rails very early in July. New orders for rails this month also show an increase. Demand for standard railroad spikes and track supplies is also much heavier and only on the most favorable specifications will manufacturers quote below $1.55, Pittsburg, for railroad spikes. We quote the market as follows, the base price on open hearth rails being 1.34c per pound at the mill:

Fifty-pound and heavier, 1.25c per pound; carloads and less than 500 tons, 1.34c per pound; light rails on base weight of 40 to 45 pounds, 1.16c, the schedule on the other weights being irregular and subject to negotiations; angle splice bars for standard sections, 1.50c, Pittsburg; track bolts, 2.25c, Pittsburg.

RAILROAD SPIKES.

4½, 5 and 5½ x ⅝	$1.55 to $1.60
3, 3½, 4, 4½ and 5 x ½	.10
3½, 4 and 4½ x ⅝	.20
3, 3½, 4 and 4½ x ⅜	.30
2½ x ⅜	.40
2½½, 3 and 3½ x ⅞	.60
2 x ⅞	.80

Steel.—One local steel company has practically all the billet and sheet bar tonnage on its books that it can handle during the next two or three months, while another leading manufacturer shows a gain of between 30 and 35 per cent in mill orders so far this month. Most of the contracts for billets and sheet bars which will expire Friday of this week have been extended to cover the third quarter. Prices are firm and in one or two instances premiums have been paid for prompt delivery on small orders for forging billets. Only in a few cases have manufacturers been requested to quote on billets and sheet bars for delivery beyond Oct. 1. The Bessemer and open hearth departments, including the rail mill, of the Ohio works of the Carnegie Steel Co., were started Monday of this week and additional mills have been started by several independent steel companies. We quote the market as follows:

Bessemer 4 x 4 billets with 0.25 carbon and less are quoted at $21, with the usual extras for size and analysis, and open-hearth rolling billets, $21. Bessemer sheet and tin bars are quoted at $22, and open-hearth sheet bars are quoted at $22, f. o. b. Pittsburg or Youngstown, with full freight to destination added. Forging billets are quoted at $26, Pittsburg.

Hoops and Bands. — Specifications against contracts for hoops and bands are only moderately heavy and new demand is light. Prices are firm. We quote the market as follows:

Hoops in carload lots, 1.40c, Pittsburg; in less than carload lots, 1.50c to 1.55c; bands, 1.25c base, with net extras, as per standard steel.

Merchant Bars.—The improvement in the steel bar market has not been uniform. One or two companies have booked extremely heavy tonnage since June 1 and have about all the business they can handle during the next four or five months, while other mills have booked only moderate tonnage. During the week several large contracts for steel bars were placed by the agricultural trade, but the major portion of this business has not been placed. The Republic Iron & Steel Co. is operating its mills practically full and most all other mills are running to greater capacity than two weeks ago. It has not been decided how many mills will be affected by the usual midsummer shutdown, but the indications are that a large number of plants will close Friday midnight for a week or ten days at least. The bar iron market is quiet and weak. Demand for shafting is only fair. We quote the market as follows:

Common iron bars, 1.25c, Pittsburg; Bessemer and open-hearth steel bars, 1.25c; plow and cultivator, 1.25c; channels, angles, zees, tees, under 3-inch, 1.35c, all f. o. b. mill. The following differentials are maintained on steel: Less than 2,000 pounds of a size, 0.35c advance. Cold rolled and ground shafting, 60 per cent off in carloads and 55 per cent in less than carloads, delivered in base territory.

Muck Bar.—There is no important inquiry for muck bar and no sales have been reported for some time. We continue to quote the best grades of muck bar nominally at $29, Pittsburg.

Structural.—There is more activity in the structural steel market than

for some months. The American Bridge Co. has received contracts for 4,000 tons of bridge work for the Baltimore & Ohio railroad, 3,800 tons of bridge work for the Louisville & Nashville railroad and 14 government barges at Memphis and Vicksburg, involving about 1,700 tons of steel. The Riter-Conley Mfg. Co., Pittsburg, has been awarded a contract for the addition to the Fulton Iron Works, St. Louis, which will require in the neighborhood of 1,500 tons of steel. This company has also been awarded a contract for a new plate mill for the Republic Iron & Steel Co., at Youngstown, O., which will require several hundred tons of steel. The McClintic-Marshall Construction Co. has received contracts for 450 tons for a machine shop for the Atlantic Coast Line and 125 tons for the Hawley Down-Draft Furnace Co. While competition among fabricators is still very keen, some companies are not quoting as low prices as a month ago. We quote the market as follows:

Beams and channels, 15 inches and under, 1.35c; over 15 inches, 1.45c; zees, 1.35c; tees, 1.40c; angles, from 3 to 6 inches, 1.35c; over 6 inches, 1.45c; universal and sheared plates, 6¼ inches wide and wider, 1.35c.

Merchant Pipe.—The market on pipe is not making a very creditable showing, although some mills report a fair run of miscellaneous business. About three months ago, practically all mills made contracts with jobbers for merchant iron and steel pipe up to July 1 and a few of these contracts are understood to have been extended. Reports of price concessions are heard. A western interest has placed an order with a local mill for 15 miles of 4-inch steel pipe and a local gas interest has entered the market for 30 miles of 16-inch steel pipe. We quote the following official discounts in carload lots, subject to the usual preferential discount to the larger buyers, merchant pipe, where specified, being offered in from ⅛ to 6 inches:

Iron and Steel Pipe Basing Prices.

	Steel.		Iron.	
	Butt weld.			
	Black.	Galv.	Black.	Galv.
⅛, ¼, ⅜ inch.....	72	58	68	54
½ inch	75	63	71	59
¾ to 1¼ inch.....	79	69	75	65
2 to 3 inches	80	70	76	66
	Lap weld.			
2 inches	76	66	72	62
2½ to 4 inches	78	68	74	64
4½ to 6 inches.....	77	67	73	63
7 to 12 inches.....	75	59	71	55
EXTRA STRONG, PLAIN ENDS.				
		Butt weld.		
⅛, ¼, ⅜ inch	69	59	65	55
½ inch	74	68	70	64
¾ to 1¼ inch	78	72	74	68
2 to 3 inches.....	79	73	75	69
EXTRA STRONG, PLAIN ENDS.				
		Lap weld.		
2 inches	75	69	71	65
2½ to 4 inches.....	77	71	73	67
4½ to 6 inches.....	76	70	72	66
7 to 8 inches.....	69	59	65	55
9 to 12 inches.....	64	54	60	50
DOUBLE EXTRA STRONG, PLAIN ENDS.				
		Butt weld.		
½ inch	64	58	60	54
¾ to 1¼ inch.....	67	61	63	57
2 to 3 inches	69	63	65	59
DOUBLE EXTRA STRONG, PLAIN ENDS.				
		Lap weld.		
2 inches	65	59	61	55
2½ to 4 inches.....	67	61	63	57
4½ to 6 inches.....	66	60	62	56
7 to 8 inches	59	49	55	45

Plugged and reamed pipe is furnished at 2 points higher price, either butt or lap weld.

Boiler Tubes.—Many of the contracts for merchant and locomotive boiler tubes made some time ago will expire June 30, but users are showing little interest and only a few contracts have been made for third quarter. Prices are irregular. We quote the following official discounts on steel boiler tubes in carload lots to jobbers:

1⅜ to 2¼ inch	65
2½ inch	67½
2¾ to 3¼ inch	70
3½ to 4½ inch	72½
5 and 6 inch	65
7 to 13 inch	62½

To destination east of the Mississippi river will be sold at delivered discount for carloads lowered by 2 points, for lengths 22 feet and under; longer lengths, f. o. b. Pittsburg. Usual extras to jobbers and boiler manufacturers.

Wire Products.—The reduction of $2 a ton on all wire products, announced last week, has brought out a slightly larger volume of business, as the lower prices were announced at a time when a large number of consumers were negotiating for second half requirements. The bulk of the business placed during the past week is for forward delivery, as there has been a noticeable falling off in the demand for prompt shipment. Jobbers' stocks are not very heavy. Western manufacturers of cut nails continue to quote 1.60c, Pittsburg, but this price is understood to have been shaded on particularly desirable business. We quote the market as follows:

Wire nails, jobbers' carload lots, $1.80; retailers' carload lots, $1.85; cut nails (western makers), jobbers' carload lots, $1.60; painted barb wire, jobbers' carload lots, $1.80; retailers' carload lots, $1.90, with 30c for galvanizing: plain wire to jobbers in carloads, $1.60, and to dealers, in carloads, $1.65; polished staples, $1.80; galvanized staples, $2.10.

Wire Rods.—The new quotation of $27, Pittsburg, on wire rods has not brought out much business, as most users are covered by contract, trading in the open market being confined to from 100 to 300-ton lots. Several contracts made April 1 have been extended to cover the third quarter. We quote $27, Pittsburg, on Bessemer and open-hearth rods.

Coke.—A heavy tonnage of furnace and foundry coke for last half shipment has been sold during the week. We note sales of 9,000 tons of furnace coke for last half at $1.65, ovens; 11,000 tons of a somewhat higher grade of furnace coke for last half delivery at $1.75, ovens, and 8,000 tons for July shipment at $1.55, ovens. In addition to the above, several consumers of furnace coke have closed for their full requirements over the last half, aggregating upward of 30,000 tons a month, or approximately 200,000 tons for the six months beginning July 1. A Reading, Pa., interest is in the market for a round tonnage of furnace coke for last half. A New York state interest with six plants in different sections of the country has purchased 7,000 tons of foundry coke for last half shipment at a price slightly above $2, ovens. Several other users of foundry coke have closed for small lots at about the same price. The General Electric Co. entered the market this week for 14,000 tons of foundry coke for the year beginning July 1, and the Westinghouse Electric & Mfg. Co. has put out an inquiry for about 5,000 tons of foundry coke for delivery at East Pittsburg, Northside (Pittsburg), and Cleveland, over the nine months beginning July 1. Other inquiries for foundry coke include about 6,000 tons for a local foundry interest; a round tonnage for a car manufacturer and round tonnages for the American Steel Foundries and the American Locomotive Co., noted recently. While furnace coke loaded in cars, which must be moved, has been offered for immediate shipment at low prices, the general asking price of standard furnace coke for prompt shipment is $1.40 to $1.50, ovens. We quote standard Connellsville furnace coke for prompt shipment at from $1.40 to $1.50, ovens, and for second half at from $1.60 to $1.75, ovens. On high grade Connellsville foundry coke, we quote from $1.80 to $1.95, ovens, for prompt shipment, and from $2 to $2.40, ovens, for forward delivery. The Connellsville *Courier's* figures for the week ending June 17 show 23,604 active ovens with an output of 271,088 tons, as compared with 23,754 active ovens and a production of 266,646 tons the previous week.

Old Material.—The embargo against shipments of heavy melting steel to the principal consuming interest at Monessen, Pa., noted last week, has been extended to cover all consumers of scrap at Monessen. This is the first time in years that the embargo at that point has been made general. An embargo has also been declared against shipments of heavy melting steel to one or more plants down the Ohio river and some of the smaller consumers of scrap have asked for a suspension of shipments against contracts, owing to the fact that a number of mills will close for a brief period at least on June 30. A peculiar condition has developed in the local scrap market. Despite the fact that a suspension of shipments has been re-

quested by several consumers and that trading is very light, dealers are unable to pick up very heavy tonnage at prices quoted during the early part of the month. Both producers and dealers look for an improvement in this market about the middle of next month. We quote, gross tons, delivered in the Pittsburg district, including Monessen, Sharon, Steubenville, Brackenridge and Follansbee, as follows:

Heavy melting scrap	$12.75 to 13.00
Rerolling rails	13.50 to 14.00
Bundled sheet scrap	11.00 to 11.50
Iron axles	23.50 to 24.00
Old iron rails	15.50 to 16.00
Stove plate	10.50 to 10.75
No. 1 wrought scrap	13.50 to 14.00
Old car wheels	12.75 to 13.00
Low phosphorus	16.50 to 17.00
Machine shop turnings	9.00 to 9.25
Cast borings	8.75 to 9.00
No. 1 cast scrap	13.00 to 13.50
Malleable	13.00 to 13.50

CHICAGO

Mills Increase Rolling Schedules—Pig Iron Prices Low.

Office of THE IRON TRADE REVIEW,
1328 Monadnock Block, June 27.

Specifications and new business in finished materials show further improvement and June is destined to make a much more satisfactory showing than May. Practically all mills, including those making iron bars, have increased their rolling schedules. In the case of some plants making bar iron and the local sheet mills, the production is practically up to full capacity. Low prices prevail in the pig iron market and while a large volume of inquiry has appeared, buyers are slow in closing. Specifications on steel bar contracts received by local mills last week show handsome gains and in the case of the leading interest will run 50 per cent ahead of last month. There is still, however, a considerable volume of bar business to be placed with the makers of agricultural implements, who are watching the progress of the growing crops keenly. From reliable reports it appears that the damage due to hot weather in the spring wheat belt has been grossly over-estimated, conditions in Minnesota and North Dakota being exceptionally favorable to a record yield. Railroad buying has been in evidence during the past week. The Great Northern has let 1,000 tons of culvert pipe to the leading cast iron pipe interest and the Northern Pacific is also in the market for culvert pipe. The Northern Pacific has ordered 500 steel underframes. The Great Northern has ordered 1,000 box cars from the Haskell-Barker Car Co.

Pig Iron.—Inquiry is heavy, but buyers are slow in closing contracts for iron. Low prices on southern iron and weakness in the northern market is undoubtedly responsible for most of the inquiry. The Bucyrus Co., South Milwaukee, is in the market for 750 tons of northern basic; other basic and northern foundry inquiries in this market aggregate 8,000 tons. Local malleable interests are asking for prices on upward of 5,000 tons of malleable for shipment over the year. A La Porte, Ind., foundry is inquiring for about 2,000 tons and a Milwaukee interest for 1,000 tons of southern No. 2 foundry iron. A Sandwich, Ill., foundry has purchased 500 tons of southern iron and a local manufacturer of electrical instruments has bought a small tonnage of 3 to 4 per cent silicon iron. The price of southern No. 2 remains at $10, Birmingham, for third quarter, and $10.25 for fourth quarter delivery. Northern iron made in local furnaces is weak, largely on account of the low price of southern iron and the competition of furnaces at Detroit and Toledo, which have a $1.70 freight rate to Chicago.

The following prices represent the market for Chicago delivery, except northern foundry No. 2 and malleable Bessemer made in local furnaces, which is quoted f. o. b. furnace:

(Shipment this year.)

Lake Superior charcoal	$17.00
Northern foundry No. 2	15.00
Southern foundry No. 2	14.60
Southern silveries, 5 per cent silicon	16.35
Jackson Co. silveries, 8 per cent	18.40
Malleable Bessemer	15.00
Alabama basic	14.60

Billets. — The demand for forging billets is broadening slightly, although prices remain unchanged, and in fact higher quotations can not be expected as long as the prices of finished material generally remain at the present level.

We quote, open hearth forging billets, $27.50, f. o. b. Chicago and open hearth re-rolling billets, $23.60.

Merchant Bars.—Business in steel bars increased heavily recently. The leading interest reports that specifications so far in June exceed the corresponding period in May by 50 per cent. A fair number of agricultural contracts have been placed but a large volume of this business is still awaiting settlement. Prices are well maintained, although there is some shading on small lots for quick shipment from the mill, amounting to not over 50 cents a ton. Bar iron mills are improving their rolling schedules and in certain cases some of the larger mills in this district are running practically at capacity. Prices remain unchanged, but should the mills become permanently filled with business an advance in bar iron quotations, which are relatively low, may be expected. Hard steel is weak and the volume of business moving is only moderate.

We quote, Chicago delivery, as follows:

Bar iron, 1.20c to 1.25c; hard steel bars, rerolled, 1.22½c to 1.30c; soft steel bars and bands and small shapes, 1.43c to 1.48c, base; hoops, 1.63c to 1.68c; smooth finished machinery steel, 1 inch and larger, 1.83c. Shafting 60 per cent off list for carload lots, 55 per cent off for less.

On iron and steel from local stock, we quote, as follows:

Bar iron, 1.80c to 1.90c per pound base; soft steel bars, 1.65c to 1.75c per pound base; soft steel hoops, 1.80c to 1.90c, full extras.

Structural Material.—Prices are firm and orders for shapes on mill books have increased very largely this month. Fabricating contracts last week were light. The Woodmen of the World building, Omaha, Neb., 2,731 tons, will be fabricated by the Noelke-Richards Iron Works. Buildings for the ore concentrating plant of the Wisconsin Steel Co. at Hawkins mine, Nashwauk, Minn., 447 tons, have been taken by the McClintic-Marshall Construction Co. About 2,000 tons of bands and 600 feet of steel trestle for the Green river water supply project, Tacoma, Wash., will be supplied by the Illinois Steel Co. The steel contract for the federal building, Chicago, 1,300 tons, Marshall & Fox, architects, is pending.

We quote, structural material, f. o. b. Chicago, as follows:

Beams and channels, 15 inches and under, 1.53c. For extras, see Pittsburg report.

Plain material out of store, is as follows:

All angles, 3 inches and larger, including 6 inches, $1.75 to $1.85 per 100 pounds; angles over 6 inches, $1.85 to $1.90 per 100 pounds, base; beams, 3 to 15 inches, inclusive, $1.75 per 100 pounds, base; channels, 3 inches and larger, $1.75 per 100 pounds, base.

Rails and Track Supplies.—Rail specifications continue heavy and new business is moderately good. Orders taken by the Illinois Steel Co. last week total 14,000 tons. Business in light rails remains steady. Track supply specifications are keeping pace with rail orders.

We quote, light rails, f. o. b. Chicago, and track supplies, f. o. b. Joliet, as follows:

Light rails, carloads, 40 to 45-pound, 1.16c to 1.20½c; 30 to 35-pound, 1.19½c to 1.24c; 16, 20 and 25-pound, 1.20½c to 1.25c; 12-pound, 1.25c to 1.29½c.

Light section relayers, 45 pounds and under, subject to inspection, $21 to $23; standard section relaying rails, subject to inspection, $23.50 to $24.

Track supplies, f. o. b. Joliet, angle bars, 1.50c to 1.60c; railroad spikes, 1.65c to 1.75c;

smaller size spikes, 1.70c, base; track bolts with square nuts, 2.10c to 2.20c, base.

Plates.—The output of Chicago plate mills during June will considerably exceed the May record. Forty-five hundred feet of riveted steel pipe for the Green river water supply project, Tacoma, Wash., will be supplied by the Illinois Steel Co. The Northern Pacific has ordered 500 steel underframes from a western interest and the Great Northern has ordered 1,000, 40-foot, 40-ton box cars from the Haskell-Barker Car Co. Plate specifications are coming in from a wide range of consumers, including tank builders, boiler shops, car plants and fabricating shops. There is no evidence of shading in this market.

We quote, mill prices, f. o. b. Chicago, as follows:

Tank plates, ¼ inch thick, 6¼ to 100 inches wide, 1.53c. For extras, see Pittsburg report.

Store prices are as follows:

Tank steel, ¼ inch and heavier, up to 72 inches wide, 1.75c to 1.85c.

Sheets.—Specifications continue to run heavy. Local makers have booked more tonnage since June 1, than during any corresponding period within the past year. This is attributed to the low prices which buyers apparently realize are at about bottom. Also stocks in the hands of jobbers and consumers have been very light. Store business is good.

For mill prices, see Pittsburg report. Freight to Chicago, 18 cents.

Chicago store prices are:

Blue annealed, No. 10, 2c; No. 12, 2.05c. Box annealed, No. 28, 2.65c. Galvanized, No. 28, 3.55c.

Wire Products. — Considering the season, business in wire is holding up very well. The recent reduction in prices amounting to $2 a ton, has not changed conditions to any extent; in fact very little tonnage was actually delivered at the higher quotations. Nail business has been somewhat disappointing this spring, due to general business conditions and labor troubles in the building trades. Crop reports from authentic sources state that the damage in the spring wheat districts has been greatly exaggerated and wire makers are confidently expecting a heavy fall demand from agricultural sources.

We quote, f. o. b. Chicago, as follows:

Wire nails, jobbers' carload lots, $1.88; retailers' carload lots, $1.93; retailers' less than carload lots, $2.03; painted barb wire, jobbers' carload lots, $1.88; retailers' carload lots, $1.93; retailers', less than carload lots, $2.03; with 30c for galvanizing; plain wire to jobbers, $1.68; plain wire, retailers' carload lots, $1.73; staples, bright, $1.88.

Merchant Pipe and Tubes.—There has been very little change in the pipe and tube situation during the past week. The volume of business in merchant pipe booked this spring has been somewhat disappointing, due largely to local labor disturbances. No particularly large awards have been placed in the market recently, although the tonnage involved in miscellaneous orders has been moderately heavy. The demand for boiler tubes out of stock remains moderately good.

We quote, merchant pipe and tubes, out of store, as follows:

Iron and Steel Pipe Basing Prices.

	Steel. Black.	Steel. Galv.	Iron. Black.	Iron. Galv.
⅛-¾ inch	69.2	54.2	63.2	48.2
⅞ inch	72.2	59.2	66.2	53.2
2 in. to 3 in.	77.2	66.2	72.2	61.2
4½-6 inches	74.2	63.2	69.2	58.2
7-12 inches	71.2	54.2	67.2	50.2
Extra Strong Plain Ends.				
⅛ inch	70.2	63.2	54.2	52.2
2-3 inches	75.2	68.2	61.2	55.2
7-8 inches	65.2	....	59.2	47.2
Double Extra Strong.				
⅛ inch	58.2	50.2	....	....
2-3 inches	63.2	55.2	....	....
7-8 inches	53.2	41.2	....	....

Tubes.

	Lap weld steel. Per cent.	Charcoal iron. Per cent.	Shelby seamless. Per cent.
1 inch	39	..	57½
1¼ to 2¼ inch	55	40	35
2¾ to 3¼ inch	62½	50	46

Cast Iron Pipe. — Cast iron pipe makers continue to enjoy good business. The bulk of the contracts placed in the west last week were taken by the United States Cast Iron Pipe & Foundry Co. This interest has been awarded 7,500 tons of water pipe at San Diego, Cal., 2,500 tons at Muskogee, Okla., and is the low bidder on 1,900 tons of 16 to 26-inch pipe which will be formally awarded at Hammond, Ind., this week. Some railroad buying is noted, including an order for 1,000 tons of culvert pipe placed with the leading interest by the Great Northern. Pipe makers are finding some difficulty in maintaining their stocks in the smaller sizes.

We quote, f. o. b. Chicago, as follows:

Four-inch water pipe, $25.25; 6 to 12 inches, $24.50, larger sizes, $24; gas pipe, $1 a ton higher.

Old Material.—Several railroads have issued scrap lists recently and the market shows no change. The Chicago & Eastern Illinois is offering 312 tons, on which bids will be received until June 30. The Chicago, Rock Island & Pacific opened bids June 27, on 3,683 tons of various grades of old material, including 150 tons of No. 1 cast; 150 tons of No. 3 steel rails; 600 tons of No. 2 railroad wrought and 120 tons of No. 1 railroad wrought. The Chicago, Milwaukee & St. Paul opened bids on June 23, on 1,220 tons of scrap, including 500 tons of No. 1 wrought. On account of the large amount of old material on hand prices have no buoyancy.

We quote the market for delivery in consumers' yards, f. o. b. Chicago, as follows:

GROSS TONS.

Old car wheels	$12.75 to 13.25
Old iron rails	14.50 to 15.00
Rerolling rails (5 ft. and over)	12.25 to 12.75
Old steel rails (3 ft. and under)	11.25 to 11.75
Frogs, switches and guards	10.25 to 10.75
Heavy melting steel	10.25 to 10.75
Shoveling steel	9.90 to 10.40

NET TONS.

No. 1 R. R. wrought	$11.00 to 11.50
No. 2 R. R. wrought	10.00 to 10.50
Arch bars and transoms	13.50 to 14.00
Knuckles, couplers and springs	10.00 to 10.50
Shafting	15.00 to 15.50
Iron car axles	17.75 to 18.25
Steel car axles	16.00 to 16.50
Locomotive tires	16.00 to 17.00
Dealers' forge	10.00 to 11.00
Pipes and flues	8.00 to 8.50
No. 1 cast	10.75 to 11.25
No. 1 busheling	8.75 to 9.25
No. 2 busheling	6.75 to 7.25
No. 1 boiler cut	7.50 to 8.00
Boiler punchings	12.50 to 13.00
Cast and mixed borings	5.25 to 5.75
Machine shop turnings	6.25 to 6.75
Railroad malleable	10.00 to 10.50
Agricultural malleable	9.25 to 9.75
Stove plate and light cast scrap	9.25 to 9.75
Angle bars, splices, etc., iron	12.50 to 13.00
Angle bars, steel	10.25 to 10.75

CLEVELAND

High Level Bridge Will Require 3,000 Tons—Bar Mill Starts.

Office of THE IRON TRADE REVIEW, Penton Building, June 27.

Iron Ore.—The market drags along, and furnaces still show no disposition to provide for their requirements. The vessel situation continues in a very unsatisfactory condition.

On base ores with the guarantee of 55 per cent on old range and Mesabi Bessemer, and 51½ per cent on old range and Mesabi non-Bessemer, we quote as follows: Old range Bessemer, $4.50; Mesabi Bessemer, $4.25; old range non-Bessemer, $3.70; Mesabi non-Bessemer, $3.50.

Pig Iron.—Companies having furnaces outside of Cleveland report a moderate increase in orders, and one agency states that its June business has been better than for four months. In the immediate Cleveland district, however, the market is very dull. We quote delivered in Cleveland for the remainder of the year as follows:

No. 1 foundry	$14.50
No. 2 foundry	14.25
No. 2 southern	14.35
Gray forge	13.25
Bessemer	15.90
Lake Superior charcoal	17.50
Jackson Co. 8 per cent silvery	18.50

Coke.—The demand for foundry coke has improved, and some contracts are being made. We quote:

Connellsville furnace coke, $1.40 to $1.50

for prompt delivery, and $1.60 to $1.80 for second half, Connellsville foundry coke, $1.80 to $2 for prompt, and $2.15 to $2.35 for second half.

Finished Materials.—The moderate improvement which has characterized the market for several weeks continues, and specifications are making a considerably better showing. The reduction in the price of plain wire and wire products has aroused interest among buyers, and it is confidently expected that some business will soon be placed. The decision of the supreme court of Ohio that it is legal for the county commissioners to proceed with the erection of the new high level bridge across the Cuyahoga river in Cleveland will permit work to be begun at an early date. About 3,000 tons of steel will be required. It is now announced that plans for the city hall will be ready in about two weeks. The Lackawanna Steel Co. has taken 500 tons of 80-pound standard rails from the Cleveland Railway Co. The Upson Nut Co. has started its merchant bar mill, has two open-hearth furnaces operating, and is contemplating lighting the third open-hearth furnace. The King Bridge Co. has taken 800 tons of bridge material for the Wheeling & Lake Erie railroad. Cleveland makers of nuts and bolts are actively operating and apparently a fair proportion of this new business comes from the railroads.

The National Iron & Wire Co., Cleveland, has taken 400 tons for a manufacturing addition to the plant of the Adams-Bagnall Electric Co., that city. The same company was awarded a contract for 400 tons for several extra stories which are to be added to the Merriam building, Cleveland.

The director of public service, Cleveland, will receive bids until July 5, for the following quantities and sizes of cast iron water pipe: Ten tons 3-inch; 30 tons 4 inch; 300 tons 6-inch; 170 tons 8-inch; 50 tons 10-inch; 400 tons 12-inch; 1,400 tons 16-inch; 330 tons 20-inch; 900 tons 24-inch and 10 tons 30-inch. Bids will be received at the same time and place for 150 tons of special castings and 80 tons of miscellaneous castings.

Old Material.—With the local rolling mills doing little, and the usual mid-summer shutdown in immediate prospect, the market locally is lifeless. There is something of a movement of turnings from local industries into the Pittsburg district, but otherwise there is not enough business stirring to warrant its name. The same general condition prevails in the district outside the city. We quote, gross tons, f. o. b. Cleveland, as follows:

Old iron rails	$14.00 to 15.00
Old steel rails (under 6 ft.)	12.00 to 13.00
Old steel rails (over 6 ft.)	11.75 to 12.25
Relaying rails	18.00 to 19.00
Old car wheels	12.00 to 12.50
Old steel boiler plate	9.00 to 9.50
Malleable iron (railroad)	11.75 to 12.00
Steel axles	19.00 to 19.50
Axle turnings	8.00 to 8.50
Malleable iron (agricultural)	11.00 to 11.50
Heavy steel	11.50 to 12.00
Country mixed steel	9.00 to 9.50

We quote, net tons, as follows:

No. 1 R. R. wrought	$12.00 to 12.50
No. 1 busheling	10.00 to 10.50
No. 1 machine cast	11.00 to 11.50
No. 1 dealers' wrought	10.50 to 11.00
Machine shop turnings	6.00 to 6.50
Pipes and flues	8.00 to 8.50
Wrought drillings	6.50 to 7.00
Stove plate	9.00 to 9.50

More Activity in Pig Iron—Basic and Malleable Inquiries.

Office of THE IRON TRADE REVIEW,
808 Provident Bank Bldg., June 27.

Pig Iron.—Though prices have not changed materially from last week, there is more activity, a greater amount of inquiry and more sales than previously. In central Ohio, the inquiry for a round tonnage of basic by a steel interest is still open. An inquiry for 1,000 tons of malleable iron is out from central Ohio, and an inquiry for 300 tons of malleable is out from a nearby melter. From southern Michigan an inquiry is out for 3,000 tons of malleable, including five different kinds of iron, among which are noted 1,000 tons of either No. 1 northern or southern, 500 tons of iron with silicon 2 to 2.5 per cent and a similar tonnage with silicon from 3 to 4 per cent. A Louisville sanitary interest has closed for only a part of its inquiry of 3,000 tons of southern No. 2 and gray forge. The remainder of this inquiry is still open. Among the sales are noted a good tonnage of pipe iron, taken by a leading pipe interest for its southern shops, and a number of 200, 300 and 400-ton lots of foundry iron to nearby foundry melters. Malleable iron is weak and is quoted at about $13.50, though large tonnages are taking a price somewhat lower than this. Southern iron continues at about the same figures as for the past ten days, while northern iron is selling from $13.00 as a base price to $13.50 in some cases, which shows the range in price as evidenced by the present market. June promises to show considerably better total sales than May. Apparently the rate of production in both northern and southern furnace districts is still decreasing, with only a slight increase in stocks on furnace yards. Some inquiries are out for the first half of next year, but very few buyers or furnaces care to consider anything so far distant at the present figures. Based on a freight rate of $3.25 from Birmingham and $1.20 from Ironton, we quote Cincinnati and southern Ohio, f. o. b., as follows:

Southern foundry No. 2	$13.25
Southern foundry No. 3	12.75
Southern foundry No. 4	12.50
Southern gray forge	12.25
Mottled	12.25
Southern No. 1 soft	13.75
Southern No. 2 soft	13.25
Standard southern car wheel	25.25
Northern No. 2 foundry	14.20
Northern No. 3 foundry	13.70
Northern No. 4 foundry	13.20
Jackson county 8 per cent silicon	17.20

Coke.—Coke of all brands continues quiet, while the output is still decreasing in many districts, with prices unchanged. Connellsville coke is steadier than it was some weeks ago, though prices are very little firmer, and the rate of production is being curtailed only slightly. A fair number of foundry contracts have been closed, particularly for the lower grades of standard brands, upon which considerable reductions in price have been made to move an accumulated output. The better grades are firm at the quoted figures. The specifications of a large sanitary interest in Louisville for its coke requirements are still open. We quote the various producing districts as follows:

	Prompt shipment.	Contract second half.
Connellsville district:		
Foundry coke	$2.00 to 2.25	$2.00 to 2.40
Furnace coke	1.35 to 1.60	1.65 to 1.75
Wise county district:		
Foundry coke	2.00 to 2.25	2.00 to 2.25
Furnace coke	1.75 to 2.00	*Sliding [scale basis.
Pocahontas district:		
Foundry coke	2.00 to 2.15	2.00 to 2.35
Furnace coke	1.60 to 1.75	1.75 to 1.85
New river:		
Foundry coke	2.50 to 3.25	2.60 to 3.15
Furnace coke	2.10 to 2.15	2.10 to 2.20

*Sliding scale basis means $1.60 for coke based on $9, Birmingham, for pig iron, with an advance of 16 2-3 per cent of the amount over $9 at which pig iron is quoted. This is the usual basis. Other forms of sliding contracts are also made.

Finished Material.—Finished steel, particularly in structural lines, is showing better activity than for some little time. The demand for steel bars is good. Local steel makers report a large number of orders on hand, while the productive capacity of the mills in southern Ohio will soon be increased by the addition of several additional mills. Steel is firm on a basis of 1.25c, Pittsburg.

Old Material.—A large amount of railroad scrap totaling several thousand tons, some of which has been held over from last month, will be disposed of in the next week or so. Local rolling mill buyers are taking some fair lots of melting steel, but foundry scrap is dull. We quote the old material market for delivery in consumers' yards, f. o. b. southern Ohio and Cincinnati, as follows:

GROSS TONS.

Old iron rails, gross	$14.00 to 14.50
Old steel, rerolling, gross	13.00 to 14.00
Old iron axles, gross	19.25 to 19.75

Steel melting scrap, gross	11.00 to 11.75
Car wheels, gross	11.50 to 12.50

NET TONS.

Old No. 1 R. R. wrought	$12.25 to 12.75
No. 1 machinery	10.50 to 11.00
No. 1 busheling	9.25 to 9.75
Stove plate	7.75 to 8.25
Machine shop turnings	6.50 to 7.00
Cast borings	5.50 to 6.25
Grate bars	7.75 to 8.50
Sheet scrap, bundled	7.50 to 8.50
No. 1 cast scrap	11.00 to 11.75
Heavy turnings	7.75 to 8.75

NEW YORK

Some Iron Buying By Large Interests —Structurals Improved.

Office of THE IRON TRADE REVIEW, 1115 West Street Bldg., June 27.

Iron Ore.—Reports are current that some other good-sized blocks of foreign ore, apart from the large purchase of Swedish ore by the Bethlehem Steel Co., previously announced, are under negotiation in the east. Sellers of eastern domestic ores have made at regular prices some additional sales to eastern furnaces, which had been pending for some time, but these tonnages have not been large. The delivery of the Swedish ore to the Bethlehem Steel Co. will be distributed over ten years and it is understood an equal tonnage will come in each year regardless of trade conditions.

Pig Iron.—Apart from the inquiries now pending from some of the larger buyers, which are more or less of a tentative nature, the market shows no semblance of any buying movement. Sellers have more tonnage to work upon, but the larger part of this is from a comparatively few interests, as the smaller buyers and consumers in general still follow their policies of closing for small lots from time to time. The undertone of the market lacks firmness, as there is evidence of sharp competition between some of the eastern Pennsylvania and some of the Buffalo furnaces and low prices are reported in different eastern districts. The Buffalo market is quotable at from $13.00 to $13.50, furnace, for No. 2X, the inside price going principally to the larger buyers, while standard grades of eastern Pennsylvania iron are held at $14.25 to $14.50, furnace, for No. 2X. The New England market is quotable at from $15.45 to $15.70 for No. 2X, although lower price reports, which lack confirmation, are current. Some of the principal competitive business in New England this week has been done around $15.50, delivered, for No. 2X. The principal purchase of the week was by a Massachusetts buyer of 6,000 to 8,000 tons of No. 2X and special foundry grades for last half, which was divided between Buffalo and eastern Pennsylvania makers. Another leading buyer is inquiring for 5,000 tons and some other good sized tentative business, upon which low prices are sought by melters, is before sellers. A New Jersey buyer is out for 800 tons of No. 2X. In routine inquiry, about 1,000 tons of malleable are out and some larger tentative business, which has been in sight for some time, is still up. This grade is better held than foundry, Buffalo sellers maintaining a minimum of about $13.25, furnace. We quote for prompt and third quarter delivery, as follows:

Northern foundry No. 1	$14.75 to 15.25
No. 2X foundry	14.50 to 15.00
No. 2 plain	14.25 to 14.50
No. 2 Virginia	15.05 to 15.30
No. 2 southern foundry	14.00 to 14.50
Malleable	14.75 to 15.25
Gray forge	14.25 to 14.50

Ferro-Alloys.—Fifty per cent ferro-silicon continues to develop very low prices, recent carload business having freely brought out quotations of $52.00, delivered, at middle western points. An eastern consumer has closed for 160 tons of ferro-manganese for delivery over the year at $36.50, Baltimore, which continues the prevailing price for this alloy. About 500 tons in inquiry is pending. Some small sales of ferro-phosphorus are noted. We quote standard 80 per cent ferro-manganese at from $36.50 to $36.75, Baltimore, and 50 per cent ferro-silicon at from $52.00 to $52.50, Pittsburg.

Cast Iron Pipe.—A fair amount of business is being closed in private and public lettings, but this is marked by low quotations. Little new public work has come out in the east the past week, but Greater New York was to take bids June 28 on about 2,000 tons of assorted sizes. We quote 6-inch pipe at from $21 to $21.50, f. o. b. New York, in carload lots.

Finished Material.—Improvement in the finished market is still of an irregular character and is apparently not being shared in equally by all makers. The principal gains in tonnage continue to be made in rails and structural material, with a less degree of betterment in other finished lines. Structural bookings and offerings in the metropolitan district are more active and are now estimated at about 50,000 tons monthly, which closely approximates the normal figures.

Bridge work by the railroads continues to be released more freely. The Baltimore & Ohio has placed 4,000 tons of bridge work with the American Bridge Co., the largest single order of this nature placed for several weeks, and 250 tons for the Newark, O., division, with the Pennsylvania Steel Co.; the Boston & Maine railroad has awarded 500 tons to the American Bridge Co. and has taken bids on 1,400 tons for a bridge at Rotterdam, N. Y.; the Atlantic Coast Line has placed 450 tons for a machine shop with the McClintic-Marshall Construction Co.; and the New York, Westchester & Boston, 350 tons for four stations with the Hudson Structural Steel Co. The New York Central has put out inquiries for 1,400 tons in two lots for additional work on its terminal improvements, this city; 500 tons for signal bridges and 400 tons for bridge work in Buffalo, upon which bids go in this week; the Central Railroad of New Jersey is inquiring for 400 tons of girder work and is expected to soon put out a larger tonnage for bridges at Hackensack and Passaic, N. J. The taking of bids on the Kansas City Union station, which will require 10,000 tons or more, has been extended to July 12.

The McClintic-Marshall Construction Co. has 1,200 tons for the new boiler and pump plant of the American Sugar Refining Co., Brooklyn; Levering & Gerrigues, 1,000 tons for the Ayer building, on Forty-seventh street, this city; the American Bridge Co., 1,000 tons for the Weil warehouse at Greenwich and Lafayette streets, for which Post & McCord have the general contract; the W. E. Lyon Iron Works, 500 tons for the stables of the Sheffield Farms-Slawson-Decker Co., Fulton street, Brooklyn; Levering & Gerrigues, 600 tons for the Hess loft on Twenty-seventh street, this city, which will be Bethlehem sections; the A. E. Norton Co., 750 tons, for the Donnelly loft, up town, which will also be Bethlehem sections; the Baltimore Bridge Co. is low on 900 tons of government signal towers at Arlington, Va.

Bids went in today on 3,000 tons for the Adams Express building, at Lexington avenue and Forty-ninth street, this city. The Old Dominion Steamship Co. has up 2,000 to 3,000 tons for the construction of four piers at Norfolk, Va., for the Norfolk Terminal Co. The proposed Phipps and Dowling loft buildings on adjoining sites at Fifth avenue and Fifty-second street, are to be combined as one structure and will require about 1,600 tons. Bids have gone in on 500 to 600 tons for St. Anthony's hospital at Woodlawn, Long Island; the addition to the Bellevue Hospital at Twenty-sixth street and First avenue, will require 1,200 tons. The Hartford National Bank building, Hartford, Conn., the general contract for which has gone to the Wells Bros., will require 600 tons.

The Erie railroad is planning the purchase of 4,000 freight cars of assorted types. This is the largest prospective car order for a number of months. Otherwise, there is little interest in equipment purchases by the railroads.

Angles, 3 to 6 inches and heavier, 1.51c; tees, 3 x ¼ inch and heavier, 1.51c; plates, carload, tank, 1.51c; boiler steel, 1.61c; marine boiler, 1.91c; bar iron, 1.30c to 1.35c; soft steel bars, 1.41c.

Old Material.—The scrap market shows no special features, as buyers continue to fill their needs through small lot purchasing. Old contracts are being drawn against and there

is not much disposition by consumers to make new commitments. The usual summer shutdown period next week, which is before the mills, is making them even less inclined to take on any lots at this moment. We quote, gross tons, prices New York dealers will pay at tidewater, with the exception of cast scrap, which has a local demand, as follows:

Old car wheels	$11.50 to 12.00
Old iron axles	17.50 to 18.00
Old steel shafting	14.00 to 14.50
No. 1 heavy melting steel	10.75 to 11.00
No. 1 R. R. wrought	12.00 to 12.50
Iron track scrap	11.00 to 11.50
Wrought pipe	10.00 to 10.50
Cast borings	5.75 to 6.00
Wrought turnings	6.00 to 6.50
Heavy cast scrap	11.50 to 12.00
Railroad, malleable	10.00 to 10.50
Stove plate	8.75 to 9.00
Grate bars	9.00 to 9.50

Freight rates on scrap per ton to Steelton, Pa., Columbia, Pa., Pottsville, Pa., Steelton, Pa. and Harrisburg, Pa., are $1.50 from Jersey City and $2.00 from New York; to Coatesville, Pa., Ivy Rock, Pa., Phoenixville, Pa., and Reading, Pa., $1.50 from Jersey City and $1.80 from New York; to Bethlehem, Pa., $1.10 from Jersey City and $1.60 from New York and to Roebling, N. J., $1.00 from Jersey City and $1.50 from New York.

PHILADELPHIA

More Tonnage Out in Pig Iron—Some Finished Improvement.

June 27.

The general tone of the market is more hopeful. More substantial assurance of improvement is offered in some lines of finished material, notably structural, and the outlook for more railroad buying after July 1 is more promising. The betterment in the finished market, however, is still unevenly distributed. More tonnage in pig iron is before makers, but the instability of prices is a factor of disturbance.

Pig Iron.—More prospective business is now before eastern pig iron makers than for some time, but any more cheerful sentiment over the outlook is tempered by the low prices to be heard in different eastern districts resulting from the drives being made for orders by some furnaces. It is felt, however, that there is considerable third quarter requirement uncovered and that, if buyers could be satisfied that price cuts are at an end, some fair buying would follow. The American Car & Foundry Co. through western offices has closed for 2,000 tons of No. 2 and 1,000 tons of malleable for last half shipment at Berwick, Pa. The Pennsylvania railroad is making awards this week on 3,100 tons of coke and 1,700 tons of charcoal iron for third quarter delivery at Altoona. A cast iron pipe maker is out for 5,000 tons of No. 3 and gray forge for delivery during September at its plant in this district. and another leading eastern buyer is inquiring in both this and the New York market for 5,000 tons of assorted foundry grades. One of the pipe makers took 500 tons of off-grade northern iron this week. Another consumer took a small lot of No. 2 plain at $14.50, delivered. Standard grades of eastern Pennsylvania foundry irons are selling at from $15 to $15.25, delivered, for 2X. Several of the eastern basic buyers are sounding the market, but no additional sales have resulted. Steel foundries in this district have been closing for some lots of low phosphorus iron and an eastern steel company recently bought 3,000 tons of this grade. The Carbon furnace at Perryville, Pa., has finally blown out, and the Oxford furnace at Oxford, N. J., will soon go out because of an accident.

We quote, for prompt and third quarter shipment, as follows:

No. 1X foundry	$15.25 to 15.50
No. 2X foundry	15.00 to 15.25
No. 2 plain	14.75 to 15.00
Standard gray forge	14.25 to 14.50
Basic	14.50 to 14.75
No. 2X Virginia	15.05 to 15.30
No. 2 southern	14.00 to 14.50
Standard low phosphorus	20.50 to 21.00

Finished Materal.—More genuine evidence of a better volume of business is being presented in some lines of finished material, but the improvement still lacks a general character. The attitude of the railroads is somewhat more encouraging, since there is some interest of those buyers in certain products in which they have been more or less apathetic, and it is strengthening a belief that these consumers will become more active after the expiration of their fiscal year, June 30. The Southern railroad sent out inquiries this week for 20,000 tons of 85-pound rails. There is a freer movement of standard spikes to eastern roads. Cut prices or 1.50c, Pittsburg, in this line are reported.

The eastern plate situation is unchanged. Some of the leading mills continue to operate about 70 per cent. A little more steel bar business has been entered, but the low bar iron price of 1.20c to 1.25c, mill, seems powerless to stimulate any consistent demand. There is more disposition among billet buyers to consider propositions for their forward requirements.

Structural tonnage is coming out in larger volume and this product seems to be contributing considerably to the improvement in the situation. The Pencoyd works of the American Bridge Co., this city, for the first time in some months is running full its 11 open-hearth furnaces and its hot metal cupola. The fabricated situation is still marked by low prices and this remains a source of dissatisfaction in the market.

The Jones & Laughlin Steel Co. has 600 tons for the Presser building, this city. Bids have been asked for July 3 on the C. & O. office or Syndicate building at Richmond, to require 1,500 to 2,000 tons; for June 30 on the Ritz-Carlton hotel, this city, about 1,000 tons. Revised plans are out for the West Philadelphia high school to close July 6. The steel requirements, 2,100 tons, have not been changed. No action has yet been taken on the Wilkins building, Washington, 500 tons. Plans are being drawn for a new museum to be erected by the city of Philadelphia, which will require 2,500 tons or more.

We quote, for delivery in Philadelphia and vicinity, as follows:

Structural shapes, 1.51c; steel plates, 1.51c; steel bars, 1.41c; refined bar iron, 1.27c to 1.32c; cut nails, $1.75 to $1.80; blue annealed sheets, No. 10 gage, 1.65c; 4 x 4-inch open-hearth rolling billets, $24.40; forging billets, $28.40.

Coke.—Three eastern blast furnace interests have just put out inquiries for their requirements of furnace coke over the last half aggregating probably 75,000 tons. Another Schuylkill valley iron maker has been inquiring for 4,000 tons monthly over the last half. For spot shipment standard Connellsville furnace coke is held at about $1.50, ovens, and for contract from 1.60c upward. Foundry consumers are closing contracts in a routine way at from $2 to $2.40, ovens.

Old Material.—Some of the iron mills have been doing a little more buying, notably in cast borings, in which $8.50, delivered, a slight advance, has been paid. This is exceptional, however, as a number of the mills will close this week for a week or 10 days for their annual summer shut-down, and they are not taking in material very freely or negotating new purchases. The activity in heavy steel is confined chiefly to the covering of old contracts and to some speculative buying by dealers, some of whom will pay $13.50, delivered. Steel consumers are buying practically nothing but bargain lots. The market generally shows no improvement. The government is offering an additional lot of 150 tons of Panama scrap. We quote gross tons, delivered in eastern Pennsylvania and consuming territory, as follows:

Old iron rails	$16.50 to 17.00
Old steel rails (re-rolling)	13.75 to 14.25
No. 1 heavy melting steel	13.00 to 13.25
Old car wheels	13.00 to 13.50
Old steel car axles	18.00 to 19.00
Old iron car axles	24.00 to 25.00
No. 1 R. R. wrought	15.00 to 15.50
Wrought pipe	12.00 to 12.50
Cast borings	8.25 to 8.75

Wrought turnings	8.75 to 9.25
Heavy cast scrap	13.00 to 13.50
Railroad malleable	11.50 to 12.00
Stove plate	10.00 to 10.50

Freight rates per ton on scrap from Philadelphia to principal eastern consuming points are: $0.60 to Ivy Rock, Pa.; $0.65 to Phoenixville, Pa.; $0.80 to Coatesville, Pa.; $0.85 to Bethlehem, Pa., Reading, Pa., and Roebling, N. J.; $1.10 to Pottsville, Pa., Lebanon, Pa., and Columbia, Pa., and $1.20 to Harrisburg and Steelton, Pa.

BUFFALO

Demand For Pig Iron is Largely From Distant Points.

Buffalo, June 27.

Pig Iron. — Considerable improvement both in inquiry and tonnage actually placed has been reported in the last few days, but practically all this new business continues to come from outside the district, a large part of it being from the New England territory. The inquiry from the Buffalo district has been small. Sales include both malleable and foundry grades with very little demand for basic. One of the largest sales reported was 1,500 tons of No. 2 for last half delivery. Some of the larger interests say that they are practically out of the market, as they refuse to meet low prices now quoted, for to meet these prices they claim would mean operating their furnaces at a serious loss. In spite of this announcement, there is no appreciable tendency toward firmer prices and the general quotations remain about the same as a week ago, though reports of a few sales at extremely low prices have justified a slight drop in some of the quotations given below. It cannot be said, however, that iron can be readily bought at the minimum quotations, and there is a strong feeling that prices will advance in the near future. Shipments on old contracts are going forward very well and a large fleet will leave here through the Erie canal this week. We quote f. o. b. furnace as follows:

No. 1X	$13.25 to 13.75
No. 2X	13.00 to 13.50
No. 2 plain	12.75 to 13.25
No. 3	13.00 to 13.25
Gray forge	13.00 to 13.25
Malleable	13.50 to 13.75
Basic	14.00 to 14.25
Charcoal	16.50 to 17.50

Finished Products.—The past week has shown a decided increase in specifications; in fact, some of the agencies say that it has been the best week in several months. This applies to both structural and general lines. One of the largest of recent structural lettings was the steel for the building to be erected by the Huebner Bleistein Patents Co., which went to the Buffalo Structural Steel Co. There have also been a few smaller lettings, ranging about 100 tons. A job calling for 1,000 tons of bars has been let by the Eastman Kodak Co., Rochester, to H. Frederichs & Sons. Within the next few days, the contract will be let for steel for the new Hutchinson high school, which will call for between 1,000 and 1,200 tons. Colson & Hudson, architects, Dun building, Buffalo, will soon be ready to receive figures on three buildings calling for a small tonnage. One of the large jobs in prospect is a seven-story brick and concrete factory to be added to the plant of the Republic Metalware Co. Prices continue firm.

Old Material.—Though still very dull the scrap market is beginning to show some signs of life and a few sales have been made, although they were mostly small. The prices here quoted are largely nominal. We quote gross tons, f. o. b. Buffalo:

Heavy melting steel	$12.75 to 13.00
No. 1 railroad wrought scrap	14.75 to 15.25
No. 1 railroad and machine cast scrap	14.00 to 14.50
Old steel axles	18.50 to 19.00
Iron axles	23.00 to 24.00
Car wheels	13.75 to 14.25
Railroad malleable, scrap	13.75 to 14.00
Machine shop turnings	7.00 to 7.25
Cast iron borings	6.50 to 6.75
Low phosphorus steel scrap	17.00 to 17.50
Old iron rails	16.75 to 17.25
Tank iron	10.75 to 11.25
Sheet iron	6.50 to 7.00
Pipes and flues	10.75 to 11.25
Stove plate	12.00 to 12.50
Grate bars	11.50 to 12.00
Boiler plate	11.50 to 12.00

ST LOUIS

Pig Iron Inquiry Somewhat Improved, But Sales Are Few.

June 26.

Pig Iron.—Although No. 2 southern pig iron is freely quoted in the St. Louis territory at $10.25, Birmingham basis, for last quarter and $10 for third quarter, nothing bordering on a buying movement has started. Pig iron, in fact, is a drug on the market. Sales in the St. Louis territory last week did not exceed 1,000 tons, mostly in lots of 100 and 200 tons. Inquiries, some of which are regarded as feelers, however, are a little better this week, totaling about 2,400 tons, with one for 1,000 tons. Northern iron is offered at $13 to $13.50, Ironton, wth very little buying.

Our tabulated prices on southern iron, delivered, to which the Birmingham freight of $3.75 has been added, remain as follows, the lower quotations being for third quarter and the higher for fourth quarter:

Southern No. 1	$14.25 to 14.75
Southern No. 2	13.75 to 14.25
Southern No. 3	13.50 to 14.00
Southern No. 4	13.25 to 13.75

Coke.—A little more interest was manifested in coke last week than has been noted for quite a while. Contracts for the last three days of the week totaled upwards of 50 cars, and inquiries are fairly good.

Our quotations run as follows:

We quote 72-hour Connellsville foundry grades, $1.90 to $2.40 for whole of 1911; 72-hour foundry, $1.90 to $2.15 on tracks and for immediate delivery; 48-hour Connellsville furnace, $1.40 to $1.50; best 72-hour Virginia foundry, $2 to $2.25; 48-hour Virginia furnace, $1.60 to $1.85. The freight to East St. Louis and St. Louis is $2.80, and $2.70 from the Virginia fields when shipment is destined beyond St. Louis.

Finished Material.—Orders for structurals were very good last week, specifications were liberal and buying was quite active at prices based on $1.35, Pittsburg. Buying of bars was better than it has been and considerable tonnage was placed. Very little was done in steel rails, but one order for 500 tons was placed by a southern railroad. Light rails were in little demand.

Old Material.—Business in scrap iron is virtually at a standstill, with quotations remaining about as follows:

Old car wheels	$12.50 to 13.00
Old iron rails	13.50 to 14.00
Rerolling rails (4 ft. and over)	12.00 to 12.50
Old steel rails (2 ft. and under)	11.00 to 11.50
Light section relayers, 45 lb. and under, subject to inspection	19.50 to 22.00
Relaying rails, subject to inspection	24.00 to 24.50
Frogs, switches and guards	11.50 to 12.00
Heavy melting steel	11.50 to 12.00
Shoveling steel	11.00 to 11.50

We quote, net tons, as follows:

No. 1 R. R. wrought	$11.00 to 11.25
No. 2 R. R. wrought	10.00 to 10.25
Arch bars and transoms	13.25 to 13.50
Knuckles, couplers and springs	12.00 to 12.50
Shafting	14.25 to 14.50
Iron car axles	18.00 to 18.50
Steel car axles	17.00 to 17.50
Locomotive tires	14.00 to 14.50
No. 1 country wrought	9.50 to 10.00
Pipes and flues	8.00 to 8.50
No. 1 busheling	9.25 to 9.50
No. 2 busheling	6.00 to 6.50
No. 1 boiler cut	7.50 to 8.00
Boiler punchings	9.00 to 9.25
Cast and mixed borings	5.00t o 5.50
Machine shop turnings	6.50 to 7.00
Railroad malleable	9.50 to 10.00
Agricultural malleable	8.50 to 9.00
Stove plate	9.00 to 9.50
Angle splice bars, iron	11.75 to 12.25
Angle splice bars, steel	11.00 to 11.50

The John F. Allen Co., builder of the Allen riveting machines, is now represented in San Francisco, Oregon and Washington, by the Berger & Carter Co., which carries a full line of Allen riveters for immediate delivery on the Pacific coast.

The New York Air Brake Co. has declared the usual quarterly dividend of 1½ per cent, payable July 28.

BIRMINGHAM

At $10 Price Movement of Pig Iron Appears Slow.

June 26.

Pig Iron.—The efforts of the producing interests to hold the market at a higher base price than $10 per ton, Birmingham, have proved futile. This price is not being quoted by all interests, but it unquestionably represents the market value of prompt shipments and would most likely be accepted for deliveries covering the remainder of the year. The tonnage sold at the reduced price is generally understood to be comparatively small. That the figures now obtainable are attractive is indicated by the increased volume of inquiry and the interest being manifested by those concerns who usually buy for speculative purposes. It is believed that during this week negotiations for a very significant tonnage for early delivery will be closed. The low grades so far sold have been practically equal to the output of such grades and in the revision of prices the differential in grades below No. 3 foundry is reduced to 25c per ton. There has also been a fairly good demand for high silicon and silvery iron and the premium usually asked for those grades has been received.

As to the condition of furnace stocks on July 1, there is some difference of opinion among the best authorities.

There is no doubt that the market is in a more settled condition than for many months past. With the price for spot deliveries firmly established on a $10 per ton basis, which is conceded to be lower than cost at the majority of furnace plants, and which is the basis the largest buyers have evidently expected since the first break from an $11.50 schedule, it seems quite reasonable to believe that the bottom has at last been reached even it the condition of the foundry trade generally is not such as to increase the present rate of consumption. We revise quotations on prompt shipment iron as follows per gross ton, f. o. b. cars Birmingham furnaces, viz.:

No. 1 foundry	$10.50
No. 2 foundry	10.00
No. 2 soft	10.00
No. 3 foundry	9.50
No. 4 foundry	9.25
Gray forge	9.00
Basic, chill cast	10.25

Old Material.—No improvement is yet noted in the condition of this market, although it is understood that the percentage of active mill capacity increased materially during the past fortnight. The transactions recorded during the past week can hardly be considered a criterion of market values and we do not attempt to revise quotations to their correct status. All grades can no doubt now be had at $1 per ton lower figures than were asked one week ago and we revise quotations per gross tons, f. o. b. cars here accordingly.

Iron axles	$14.00 to 15.00
Iron rails	12.00 to 12.50
Steel axles	13.00 to 13.50
No. 1 R. R. wrought	11.00 to 11.50
No. 2 R. R. wrought	10.00 to 11.00
No. 1 country scrap	7.50 to 8.00
No. 2 country scrap	6.50 to 7.00
No. 1 machinery	9.00 to 10.00
No. 1 steel	8.50 to 9.00
Old standard car wheels	10.00 to 10.50
Light cast and stove plate	7.00 to 7.50

San Francisco

Structural Business Improves.—Moderate Pig Iron Buying.

June 21.

The local market shows very little improvement in most lines, exception being noted in the structural market, which continues to be fairly active. A slight improvement is noted in the casting line on account of recent price cutting among local founders. Stocks of all kinds are light in the country, but in the city, dealers are well supplied.

Pig Iron.—Buying is moderate, foundries securing only what is needed for current work. We quote:

Southern No. 2	$21.00
English	23.00
Continental	20.00 to 22.50
Chinese	23.00

Finished Material.—Dealers are well supplied with bars and many reinforcing orders are being received and are in prospect. A large amount of harbor work, which is to be done by the state of California, will call for a moderate tonnage of both bars and shapes. The discovery of much unsafe work in the present piers on the water front will necessitate new work and will call for considerable steel. Bars from store are quoted: Iron 1.90c, and 2c for steel. The Judson Iron Works, of Oakland, was awarded the contract for furnishing the structural steel for the proposed Oakland city hall, a little over 3,500 tons. The Pacific Rolling Mill Co. has been awarded the contract for 705 tons of beams and channels for the Bankers' Investment Co. building and 300 tons for the San Francisco Investment Co.'s building. Dyer Brothers are fabricating material for several jobs aggregating about 600 tons. The McClintic-Marshall Co. has secured the iron and steel work on the new building being built at the Benecia arsenal, one at Angel Island and one at Eureka, aggregating 500 tons. The Masonic temple, which will require about 1,200 tons, will probably be closed the coming week. Other contracts which will be awarded soon are Lally Plumbing Co. building, 400 tons; Southern Pacific depot at Oakland, 600 tons. The American Bridge Co. is furnishing material for a number of small steel bridges scattered about the state.

Old Material.—The only feature of the old material market has been the sale of 1,000 tons of heavy machine scrap by the Risdon Iron Works, for $16.30 per ton net on the dock at the Risdon yards. Aside from this the market is a little below normal. We quote:

Steel melting scrap, gross	$10.50 to 11.00
Wrought scrap, net	11.00 to 15.00
Rerolling rails	11.00 to 13.00

British Iron Markets

Pig Iron Shows Decided Improvement in Stocks.

Office of THE IRON TRADE REVIEW,
Prince's Chambers, Corporation St.,
Birmingham, Eng., June 17.

In spite of the business check, resulting from Coronation holidays, and a certain amount of discouragement in regard to American reports, the pig iron department has shown a marked improvement this week, and a buoyant feeling to which Middlesbrough has long been a stranger, has prevailed during the last few days. The principal cause is a reduction of stocks, amounting for the week to 5,250 tons, bringing the total reserve to 590,000. After the long and rapid growth of stocks, this represents a very decided change, and prices have, to some extent, shared in the improvement, as No. 3 for prompt delivery sold yesterday at 46s 9d ($11.44), the best price for some months past. The improvement has prevailed in spite of a certain reduction in shipments, which up to June 15 totalled 47,063 tons against 64,231 tons for the previous month.

METAL MARKETS

New York.

June 27.

Tin.—The resumption of business on the London metal exchange Monday was, as had been expected, at a higher level of values in both spot and future tin. Spot opened at an advance of £2 and futures at £1 7s 6d. Sales of spot involved only 90 tons, which is the smallest total of daily transactions reported for several weeks. Interest was princi-

pally centered in the future positions, and 670 tons were bought for delivery over the next three months. The New York market reflected some of the foreign advance in spot tin, and there is still a margin of about 3c between the two markets, the New York price being above the London equivalent. Buying for immediate delivery has been confined to urgent needs of domestic consumers and has not exceeded a small total. A fair volume of business has been done in July and August, however. Spot tin is nominally 45.75c; July is 43.37½c, and August is 42.87½c. The London market advanced £1 10s in spot and declined 15s in futures today. Spot closed at £197 10s and three months at £191 15s. Tin arrivals since June 1 aggregate 1,712 tons, and there are 1,326 tons afloat.

Copper.—The London standard copper market advanced on Monday to the highest point reached since last November, and although a slight reaction occurred today, the belief is held in the local trade that the strong foreign market is a forecast of 13c copper here in the near future. It is a fact that today some large producers are asking 12.87½c for electrolytic, delivered, and 13c for lake. The leading seller, however, is quoting prices ⅛c under those figures. It is quite generally predicted that the next report of the Copper Producers' Association will show a large decrease in stocks held in first hands, and the character of the recent buying by domestic consumers indicates that the finished trade has experienced some improvement in business. The buying was widely scattered and aggregated a large total. Copper exports since June 1 are 25,398 tons.

Lead.—The leading seller of pig lead is now from 2½c to 5c under the independent interests, at 4.50c. Prompt shipments are generally held at 4.52½c in New York, and some representatives of producers are asking 4.55c.

Spelter.—Smaller demand is noted than a week ago, but sellers are not pressing sales and prices are holding well. Prime western is 5.80c in New York, for shipment, and spot commands a premium of from 10 to 15 points.

Antimony.—The market has declined from 50 to 25 points since last week. Cookson's is 8.50c; Hallett's is 8c to import, and Hungarian is 7.25c.

St. Louis.

June 26.

Lead and Zinc.—A top price of $45 a ton was realized for 60 per cent zinc ore in the Missouri-Kansas-Oklahoma district last week on an assay base of $42. Spelter quotations at St. Louis continued strong, causing considerable activity in the zinc market. Quite a number of mines that have been inactive for several weeks are again producing ore, and the prospects are bright. Very little ore was sold below $40. The average price paid for spelter during the week was 5.37c, East St. Louis, establishing the contract base at $40.14 for last week. Calamine was strong, the best grades bringing $30 a ton. In some instances $60 a ton was paid for lead ore, but the prevailing price was $58 a ton. Lead ore was in heavy demand.

Chicago.

June 26.

New Metals.—The week past has witnessed a further increase in the price of spelter, which is now quoted 5.70c, Chicago. Local consumers, except when forced by circumstances, are not buying at this level, expecting the market to drop. Lead is firm at 4.45c, Chicago, unchanged from last week. Copper is moving in fair quantities and remains unchanged in price in this market. Tin is now quoted 45¼c, Chicago.

We quote, dealers' selling prices, f. o. b. Chicago, as follows:

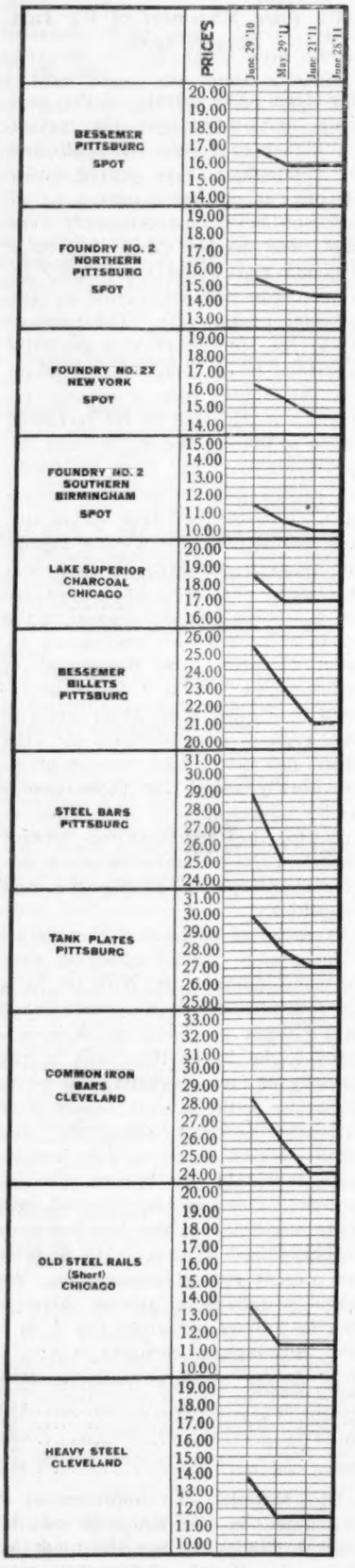
Lake copper, carload lots, 13c; casting, 12¾c; smaller lots, ¼c to ⅜c higher. Spelter, car lots, 5.70c; lead, desilverized, 4.45c in 50-ton lots; corroding, 25c per 100 pounds higher; sheet zinc, $7.25 list, f. o. b. La Salle, in car lots of 600-pound casks; pig tin, 45¼c; Cookson's antimony, 10c; other grades, 9c to 10c.

Old Metals.—Conditions are improving, although on account of the volume of stock on hand prices remain practically unchanged. Any increase in production on the part of nonferrous metal foundries will not have much immediate effect on the situation.

We quote, dealers' selling prices, f. o. b. Chicago, as follows:

Copper wire, 12½c; heavy copper, 12c; light copper, 10½c; heavy red brass, 10½c; heavy yellow brass, 9¼c, light brass, 7c; No. 1 red brass borings, 9½c; No. 1 yellow brass borings, 7½c; brass clippings, 8½c; tea lead, 3.80c; lead scrap, 4½c; zinc, 4½c; tin pipe, 39c; tin foil, 35c, pewter, 27c; electrotype plates, free from wood, 4c; electrotype dross, 3c; stereotype plates, 4½c; stereotype dross, 3¼c; linotype dross, 3¼c; prime slab zinc dross, $70 per ton.

PRICE CHART



TESTING SOCIETY

Is Now On a Solid Financial Basis—Pure Iron Discussed.

Atlantic City, N. J., June 27. (By wire.)

The manufacture of pure iron on a commercial basis in this country, its tremendous possibilities and wide application were exhaustively discussed this evening by Allerton S. Cushman, before the American Society for Testing Materials, whose 14th annual meeting opened here today. Pure iron, or ingot iron, as it is termed in the iron and steel trade, is a product of the open-hearth furnace and marks a comparatively new development, in spite of the fact that the process has a great many points in common with the open-hearth production of mild steel. Up to the present time, ingot iron has not been manufactured into all the products that are customarily made of steel, charcoal and puddled iron, but it has been successfully rolled into billets, slabs, plates, sheets, merchant iron, wire nails, pipe and boiler tubes. A wide variety of forgings has also been produced and Mr. Cushman said that there is no reason why pure iron should not have a wide and rapidly increasing use. In tensile strength, pure iron closely approximates high grade charcoal iron and in elongation and reduction of area it not only equals, but in many cases surpasses the finest soft steel. The pure ingot iron manufactured at present appears to combine the good qualities of both iron and steel with a comparative absence of at least some of the undesirable qualities of each.

"The American Society for Testing Materials" was the subject of the annual address by the president, Dr. Henry M. Howe. Attention was directed to the difficulties involved in the preparation of international specifications for materials. Two methods exist for arriving at these specifications, which were termed the direct and the stamping or indirect methods. Numerous pertinent objections were raised by Dr. Howe against the stamping plan, which is favored by some as an easy method of arriving at international standards. The difficulties of the task of formulating these specifications were pointed out and in conclusion Dr. Howe said that the problem is not an engineering, but a psychological one.

Other papers read included a study of "Measured Strains on Engineering Structures", by James E. Howard; "Heat Treatment of Some Low Carbon Nickel Steels", by Henry Fay and John M. Bierer, and "The Formation of Flue Sheet Cinders in Locomotives", by Henry Job.

The annual report of the executive committee, presented at the opening session this afternoon, was particularly gratifying, as it showed a net gain in membership of 102, the present enrollment totalling 1,382. For the first time in its history, the society is now on an independent financial basis. Instead of a deficit of $2,200, which existed a year ago, there is a balance in the treasury of $6,792, with no outstanding liabilities. Executive committee members were elected as follows: W. A. Bostwick, metallurgical engineer, Carnegie Steel Co., Pittsburg; R. W. Hunt, Robert W. Hunt Co., Chicago; Richard Moldenke, expert on foundry practice and secretary of the American Foundrymen's Association, Watchung, N. J., and W. R. Webster, civil engineer, Philadelphia.

Wage Scale Reaffirmed

Pittsburg, June 28 (By wire.)

The Republic Iron & Steel Co. reaffirmed the 1910-11 wage scale late Tuesday afternoon at a conference with officials of the Amalgamated Association of Iron, Steel and Tin Workers at the Hotel Schenley, Pittsburg. The action of the Republic company in renewing the wage scale is of vast importance in view of the fact that the Western Bar Iron Association at a meeting with the Amalgamated Association at Cambridge Springs, Pa., on June 5, demanded a reduction of 10 per cent in wages for the year beginning July 1. Another meeting will be held with the Western Bar Iron Association next week and in all probability the present scale will be renewed. Aside from a few minor changes in the foot notes, the scale signed by the Republic is the same as the one in effect at present and which will expire Friday night. Puddlers will receive $5.00 per ton on a one cent bar iron card. At present they are working on a 1.25c bar iron card and are receiving $5.62½ per ton.

Nothing Known About Report

Some newspapers published on Wednesday morning what purported to be an abstract of the findings of Herbert Knox Smith, chief of the bureau of corporations, as the result of his investigation of the United States Steel Corporation. Our Washington representative advises us that while the report has been submitted to President Taft, nothing authentic has been published for the simple reason that the report has not been made public in any way by the president and probably will not be for several days.

Farewell Dinner to W. F. McKenzie

At a farewell dinner tendered to William F. McKenzie, sales manager of the Upson Nut Co., at the Hollenden hotel, Cleveland, June 27, 30 representatives of the nut and bolt and general iron and steel industries in Cleveland and elsewhere were present. Frank W. Davis, of the Lake Erie Iron Co., acted as toastmaster, and a number of informal toasts were presented. A handsome loving cup was tendered Mr. McKenzie, who will sever his connection of some 25 years with the Upson company on July 1, to become vice president of both the Gary Bolt & Screw Co., Gary, Ind., and the Pittsburg Screw & Bolt Co., Pittsburg. Mr. McKenzie will reside in Chicago. Those present at the farewell dinner were: President W. A. Hitchcock, F. H. Rose, E. H. Martin and W. H Barrow, all of the Upson Nut Co., Cleveland; President S. D. Latty, M. E. Ewing and William Bates, of the Kirk-Latty Mfg. Co., Cleveland; H. C. Holt and George North, of the Lamson & Sessions Co., Cleveland; C. W. Scofield, Frank W. Davis and A. W. Bower, of the Lake Erie Iron Co., Cleveland; R. M. Kilgore, Cleveland district sales manager of the Jones & Laughlin Steel Co.; J. F. Harrison, of the Atlas Bolt & Screw Co., Cleveland; Ira B. Bassett, president of the Bassett-Presley Co., Cleveland; W. H Smith, of the W. M. Pattison Supply Co., Cleveland; John R. Scott, manager of sales, Cleveland, Roland S. Le Barre, assistant manager of sales, Cleveland, and W. G. Clyde, assistant manager of sales, Pittsburg, all of the Carnegie Steel Co.; Charles Graham, of the Graham Nut Co., Pittsburg; Eugene McCarthey, of Beals & Co., Buffalo; W. S. Comley, president of the Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.; President W. G. Costin and Thomas Smith, of the Pittsburg Bolt & Screw Co., Pittsburg; Charles T. Johnston, manager of sales, Pittsburg, D. S. Guthrie, district manager of sales, Cleveland, and Ralph Zimp, district manager of sales, Chicago, all of the Republic Iron & Steel Co.; J. E. Williams, of the National Screw & Tack Co., Cleveland, and Mr. McKenzie.

The Brightman Mfg. Co., Columbus, O., announces from its general offices that it will take care of the territory formerly looked after by McClernan & Co., Peoples Gas building, Chicago, for the sale of shafting, screw stock, etc. It will shortly announce its new representative in the Chicago district.

CHIEF CLERKS

Of American Steel & Wire Co. Hear Papers and Have Dinner.

A highly successful meeting of chief clerks of the accounting department of the American Steel & Wire Co. was held in Cleveland June 20 to 23. The committee on program consisted of C. A. Vogt, auditor, and A. H. Garry and S. Dunlap, assistant auditors. W. White and C. Reese acted as secretaries. Much care had been exercised in preparing the program of papers, and in the appointment of committees to consider the various problems which were presented. A large amount of committee work was done and numerous recommendations were agreed upon and submitted to Mr. Vogt. Meetings for the reading of papers were held Tuesday, Wednesday, Thursday and Friday, and on Thursday evening a dinner was held at the Union Club. The following were in attendance:

Achilles, W. L., chief clerk, A. S. & W. Co. of Colorado.
Allport, Wm., chief clerk, Consolidated works.
Bancroft, F. A., chief clerk, North works.
Bemis, E. H., chief clerk, Worcester office.
Bird, W. C., chief clerk, Sharon works.
Boyd, J. K., general bookkeeper, Cleveland office.
Breitweg, A. B., chief clerk, American works.
Cary, H. L., chief clerk, Newburg works and Central furnaces.
Cawthorne, C. S., chief clerk, Waukegan works.
Clark, E. K., chief clerk, Central works.
Diehl, C. M., chief clerk, Rankin works.
Dunlap, S., assistant auditor, Cleveland.
Dunn, Geo., accountant, Canadian S. & W. Co.
Eckert, H. L., chief clerk, Braddock works.
Field, H., chief clerk, Chicago office.
Fitzgerald, J. J., railroad bookkeeper, Cleveland office.
Garry, A. H., assistant auditor, Cleveland.
Hall, W. J., cost division, Cleveland office.
Harper, E. H., chief clerk, Rockdale works.
Hewitt, E. H., chief clerk, Trenton Iron Co.
Hill, W. E., chief clerk, Salem works.
Hoag, M. L., chief, statistical division, Cleveland office.
Jones, W. D., chief, invoice division, Cleveland office.
Kennedy, J. B., chief clerk, Anderson works.
MacKelcan, H. A., chief clerk, New York office.
Mandell, H. H., chief, cost division, Cleveland office.
Meyerhoff, J., chief clerk, Lake street warehouse.
Mize, C. B., chief clerk, Anthony works.
Morris, I., chief clerk, Birmingham works.
Morrison, E. C., chief clerk, Donora works.
Paton, J. M., chief clerk, DeKalb works.
Rennebaum, F. E., chief clerk, Cuyahoga works.
Riedl, W. M., chief clerk, New Haven works.
Roberts, G. K., chief clerk, Pittsburg office and Shoenberger works.
Seely, F. D., chief clerk, H. P. works.
Sengenberger, C. J., chief clerk, Scott street works.
Stinson, D. W., chief clerk, Allentown works.
Townsend, R. M., cost division, Cleveland office.
Vogt, C. A., auditor, Cleveland.
Wallace, D. F., chief, voucher division, Cleveland office.
Williams, W. S., chief, manufacturing accounting division, Cleveland office.
Wilson, H. F., chief clerk, Pacific coast district.

Bitumastic Solution.—In the review of a booklet, issued by Hill, Hubbell & Co., 805 Superior avenue, Cleveland, and published on page 1174 of the June 15 issue of THE IRON TRADE REVIEW, it was incorrectly stated that the solution is a black, bituminous paint containing methen oil, turpentine, No. 2 benzine, etc. This solution contains neither oil, turpentine nor benzine and is guaranteed to be free from coal tar. The errors were due to bad chirography and bad proofreading.

Corporation's Steel Capacity Running Well

With the exception of a short period in March, the steel making operations of the United States Steel Corporation are now running at the best rate this year, having exceeded 70 per cent for a short time during the past week, but on the whole are now slightly in excess of 68 per cent. This is a gain of 10 per cent in the rate of steel production over a month ago. Blast furnace operations remain about 63 per cent. One Lorain and one McKeesport stack of the National Tube Co. have been ordered out but this loss will be off-set by one South Chicago furnace, which has been ordered on and by one Ensley furnace, which is expected to be started soon. No definite period of shutting down will be observed by the Corporation mills over the holiday of the Fourth. Each plant will be run in accordance with the rolling schedules prepared for next week. Some will close Saturday to remain idle until Wednesday morning; others will cease operations Monday night, resuming Wednesday morning.

Will Resume Work

Orders have been issued to resume mining at the properties of the Antoine Ore Co., at Iron Mountain, Mich. This is a subsidiary of the Republic Iron & Steel Co. It is believed that by July 1 the mine will be in shape to produce. It is said that the company proposes to ship 100,000 tons from this mine before the close of navigation.

More Than Double.—The increased daily capacity of the Mt. Savage, Md., fire brick works of the Union Mining Co. when completed will be 100,000 brick, instead of 10,000 as stated recently, due to a typographical error. This will more than double the present daily capacity.

The Chicago Pneumatic Tool Co. has declared the usual quarterly dividend of 1 per cent, payable July 26.

NEW COKE RATES

To Northwest Will Become Effective July 15.

The Interstate Commerce Commission on June 23, vacated the suspension order issued recently against the flat freight rates on shipments of furnace and foundry coke from the Connellsville, Pa., and West Virginia coke regions to Chicago and other northwestern points, and it is stated that the new rates will become effective July 15.

Early in April notice was given by the railroads that, effective May 15, the differential in freight rates between furnace coke and foundry coke from the Connellsville, Pa., and West Virginia districts would be eliminated and that a flat freight rate would apply. A protest was filed with the Interstate Commerce Commission by the leading producers of furnace coke who later were joined by the Wisconsin Steel Co., the Iroquois Iron Co. and the Inland Steel Co., operating blast furnaces in the Chicago district, as the new tariff announced by the railroads provided for an advance of 15 cents a ton in the freight rate on furnace coke and only a slight reduction in the freight rate on foundry coke. Coke producers and consumers contend that 95 per cent of the coke shipped to the northwestern points is furnace coke. Early in May the Interstate Commerce Commission suspended these rates until June 15, and, following a hearing before the Interstate Commerce Commission on June 9, these rates were again suspended to 30 days, or until July 15. Consequently there was considerable surprise among coke producers and consumers when the decision of the Interstate Commerce Commission was handed down June 23, vacating the suspension order.

The new flat rate on coke from the Connellsville, Pa., region and from West Virginia to Chicago will be $2.50 per ton instead of $2.35 per ton for furnace coke, and $2.65 per ton on foundry coke. The flat rate to Toledo will be $1.95 per ton, instead of $1.85 per ton on furnace coke and $2.25 per ton on commercial coke. The flat rate to Detroit will be $2.10 per ton, instead of $2 per ton on furnace coke and $2.25 on commercial coke. The freight rate of $1.65 per ton to Cleveland will not be changed.

The Yale & Towne Mfg. Co. has declared the regular quarterly dividend of 1½ per cent and an extra dividend of 1 per cent, payable July 1.

A NEW PLANT

To be Built by Macomber & Whyte Rope Co. at Kenosha, Wis.

The Macomber & Whyte Rope Co., Chicago, maker of wire rope of all descriptions, has concluded a contract with the Industrial Association, at Kenosha, Wis., to locate its proposed plant at that point. The site includes 11 acres on the main line of the C. & N. W. railroad. The buildings to be erected will include a rope shop and warehouse, 140 x 440 feet; a reel shop, 40 x 60 feet, and a wire mill, 100 x 300 feet, together with other buildings as will be required for a plant of such size. The property located at Coal City, Ill., comprising about five acres, with a building 180 x 260 feet, will be disposed of or rented. The buildings contain a complete steam plant of 175 horsepower with electric light plant and modern equipment. They are located on the E., J. & E., A., T. & S. F., and C. & A. railroads.

Large Contract Awarded Pittsburg Concern

The T. A. Gillespie Co., Pittsburg, was this week awarded by the board of water supply of New York the contract for the construction of a portion of the Hudson River division of the Catskill aqueduct in the towns of Cornwall and Fishkill. The company's bid was $1,649,020 and was the third lowest, but, by reason of the importance of the undertaking, the board decided to make the award to the Gillespie company because of its complete facilities for such construction. The steel requirements of the complete portion of the Catskill aqueduct from Yonkers, N. Y., to Brooklyn, amounting to 5,000 to 6,000 tons, will be provided by the Carnegie Steel Co., as previously reported.

Sheet Mill Contract

The Reeves Mfg. Co., Canal Dover, O., has awarded a contract to the Lewis Foundry & Machine Co., Coraopolis, Pa., for four new hot sheet mills, with the necessary cold rolls and appurtenances. About two months ago this company started work on two new sheet mills, making a total of six new hot sheet mills to be built this year.

That Samuel Gompers, Frank Morrison and John Mitchell, of the American Federation of Labor, will have to stand trial once more for contempt of court unless they apologize, was the decision of a special commission appointed by Justice Daniel T. Wright, of the District of Columbia, on May 16, following the United States supreme court decision declaring the district court erred in imposing jail sentences in what were held to be civil proceedings.

Steel River Steamer Built at Memphis

Memphis, Tenn., June 26.

The new steel-hull steamer built for the Lee Line steamers by the Southern Boiler & Tank Works of this city has been completed. The hull weighs 155 tons and is equipped with water-tight compartments. It is 154 feet long, 36 feet beam and 5½ feet depth of hold. A contract has been let to the Allen Engineering Co. for the installation of the machinery, which will consist of two 300-horsepower cross compound condensing engines and locomotive firebox boilers. The boat will be able to make a speed of 25 to 30 miles an hour, and will be one of the largest and best in the Mississippi trade.

Spanish Iron Ore Prices Firm

The Middlesbrough correspondent, Iron and Coal Trades Review, London, says: "It must be reported that rubio ore continues absolutely nominal in price; merchants adhere to 20s per ton as the quotation for delivery here, but that consumers are not prepared to give, and having still large stocks, as may be seen at most of our works, they can afford to wait. Considering the prices which the Spanish mine owners ask, it is difficult to see how the merchants can afford to take less than the price they generally ask, and where anything less has been accepted, it has been in very exceptional circumstances."

The American Car & Foundry Co. advises that the fire damage inflicted on its Chicago plant, June 15, was not serious and operating has been resumed.

The Sharon Steel Hoop Co., Sharon, Pa., has declared a quarterly dividend of 1¾ per cent, payable July 1.

Manning, Maxwell & Moore have declared the regular quarterly dividend of 1½ per cent, payable June 30.

The North Butte Mining Co. has declared a quarterly dividend of 30 cents, payable July 22.

WORK STARTED

On Rebuilding Ninth Street Mill of Reading Iron Co.

Reading, Pa., June 27.

The work of rebuilding the Ninth street mill of the Reading Iron Co. has started and the structural iron workers are making considerable progress. It is the purpose to rebuild one portion at a time so that the work will not interfere with the operation of the plant. This mill was erected many years ago and the uprights and girders are of wood. These are to be replaced by steel, requiring 1,000 tons.

The departments of the company continue to operate at about the same rate as during the past several months. The several mill departments will be closed for the July cleaning up, a schedule being carried out during the week of July 4. Work is under way for the erection of a carpenter shop and warehouse for the storage of pipeballs at the tube works.

Will Vote on Stock Issue

Formal notices have been sent to stockholders of the Youngstown Sheet & Tube Co., regarding a meeting to be held July 25, to take action on the question of increasing the authorized capital stock of the company from $10,000,000 to $15,000,000, the increase to consist of $5,000,000 of 7 per cent preferred stock. The present capitalization of $10,000,000 is all common stock. The major portion of the $5,000,000 will be used for the proposed new open-hearth furnaces and finishing mills, plans for which were announced recently.

The Ft. Wayne Electric Works has been merged with the General Electric Co. and hereafter will be conducted as the Ft. Wayne Electric Works of the General Electric Co. The same lines of product will be followed and the immediate management retained with F. S. Hunting in charge as general manager.

The Clinton Iron & Steel Co., Pittsburg, has started the work of relining its blast furnace, Southside, Pittsburg, and is preparing plans for new trestle work, etc., at its plant.

The Union Switch & Signal Co., Pittsburg, has declared the usual quarterly dividend of 3 per cent on common and preferred stocks, payable July 10.

Personal

Farley G. Clark has been appointed superintendent of the Westinghouse Electric & Mfg. Co., at Pittsburg.

F. W. Becker, until recently connected with the Mare Island navy yard, is now manager of the Gasoline Safety Appliance Co., San Francisco.

Arthur W. Byron, assistant master mechanic of the Pennsylvania railroad, at Olean, N. Y., has been appointed master mechanic at Buffalo.

Stephen S. Palmer, president of the New Jersey Zinc Co., has been made a director of the Delaware, Lackawanna & Western railroad.

J. J. Harvey, formerly connected with the American Locomotive Co., has become manager of the Powell Marine Engine Corporation, Brooklyn, N. Y.

J. J. Swan, formerly sales manager of the Keller Mfg. Co., Philadelphia, has taken a position with the Chicago Pneumatic Tool Co., at 50 Church stret, New York.

E. J. Banta, formerly chief engineer of the Vulcan Steam Shovel Co., has been appointed general sales manager of the Davenport Locomotive Works, Davenport, Ia.

Edward P. Rawle was recently elected a member of the board of directors of the J. G. Brill Co., to fill a vacancy caused by the death of his brother, Francis W. Rawle.

B. F. Fackenthal Jr., president and general manager of the Thomas Iron Co., on June 21 was granted the degree of doctor of science by Lafayette college, Easton, Pa.

W. E. Manning, assistant general manager of sales of the Youngstown Sheet & Tube Co., Youngstown, O., sailed for Europe this week, where he will remain for several weeks.

D. J. Lewis, formerly sales manager of the Bundy department of the American Radiator Co., New York, has taken the position of sales manager of the Lytton Mfg. Corporation, New York.

Charles A. Thistlethwaite has accepted a position as chief draftsman for the Lodge & Shipley Machine Tool Co., Cincinnati. He was formerly connected with the Elliot-Fisher Co., Harrisburg, Pa.

Harry B. Eaton has been named sales manager for Edgar Allen & Co., Ltd., Sheffield, Eng., which conducts offices in Boston and Chicago. Mr. Eaton for 10 years was eastern manager for Hermann Boker & Co.

L. G. Berry has resigned as contracting engineer for the Des Moines Bridge & Iron Co. and organized the Southern Engineering Co., Charlotte, N. C. The new firm will engage as steel and concrete structural engineer and contractor.

William W. Manville, president, and Tracey F. Manville, secretary, have disposed of their interests in the Manville Brothers Co., Waterbury, Conn., severing their connection with that corporation, which is a builder of wire and metal working machinery.

The Duke of Devonshire, president of the Iron and Steel Institute, and members of a committee of the iron and steel manufacturers of Great Britain, are giving a banquet, on June 30, at the Savoy hotel, London, for the purpose of meeting the United States delegates to the Brussels Conference in July.—Ironmonger, London.

Official announcement is made from the general offices of the Louisville & Nashville Railroad Co. of the resignation of T. H. Curtis, superintendent of machinery, which goes into effect July 1. His successor is C. F. Giles, who has been assistant superintendent of machinery. Mr. Curtis plans the development of several railroad appliances which he has invented.

John Hays Hammond, Walter Renton Ingalls, J. Parke Channing, Dr. James Douglas and J. R. Finlay have been named consulting engineers in the United States bureau of mines and will become a committee within the bureau to develop rules for the promotion of safety in mining of metals. They have been engaged upon this work heretofore as a committee appointed by the American Mining Congress.

James A. Farrell, president of the United States Steel Corporation, sailed from New York, Tuesday, June 27, for Brussels, Belgium, to attend the international meeting of steel makers. He will return July 14. Willis L. King, vice president of the Jones & Laughlin Steel Co., also sailed Saturday, June 24, to be present at the Brussels conference as one of the official representatives of the American iron and steel industry. Samuel Mather, of Cleveland, sails today.

Among the young men who were admitted to the practice of law in Ohio, June 26, was William F. Swift, who for several years has been manager of the City Foundry, Cleveland. In spite of his many duties as a foundryman, Mr. Swift, by attending a night law school, was able to prepare for the examination before the state supreme court. Mr. Swift is a nephew of Walter D. Sayle, president of the Cleveland Punch & Shear Works Co. Two other busy young men admitted to the bar were Phillip Frankel, secretary of several associations of employers, and his brother, Frederick Frankel.

Crude Steel Firm—Inquiry for Bessemer

Pittsburg, June 28 (By wire.)

An inquiry for 10,000 tons of steel for shipment within the next sixty or ninety days to a point just west of Pittsburg, which was put out, a week ago has failed to develop a price below $21.00 f. o. b. Pittsburg or Youngstown on billets despite the fact that the consumer in this particular case can draw from seven or eight different steel works. Prices on crude steel are very firm and one large company has practically all the billet and sheet bar business it can handle in the next few months.

One valley merchant blast furnace will be blown out on Friday of this week and another merchant stack will be placed on the inactive list within a week. The Cambria Steel Co. is operating five of its eight blast furnaces. It is reported plans have been completed for another non-merchant blast furnace in the immediate Pittsburg district.

An Ohio consumer who has just purchased 100 tons of Bessemer pig iron slightly under $15.00 valley from a middleman has put out an inquiry for 1,000 tons of Bessemer for July and August shipment.

Obituary

Dr. Wilhelm Michaelis, original advocate of the use of blast furnace slag in cement, died near Hamburg, Germany, May 14.

Henry Philip Field, formerly secretary and treasurer of the Celfor Tool Co., Chicago, died at his home, 5737 Washington avenue, Chicago, on June 27. He is survived by a widow, a son and a daughter.

E. R. Evinger, aged 37, superintendent of the Miami Valley Machine Tool Co., Dayton, O., died, June 19, at the Marion, O., sanitarium, after an illness of six months. He left a widow and three children. Burial was made at his home, Savona, O.

Abraham Hanauer, identified for years with the smelting industry of Utah, died June 16, aged 77. Coming from Germany in 1854, he engaged in business in the east and in various cities of the west until in 1872 he located in Salt Lake City as an ore buyer for the Omaha smelting works. The next year he purchased an interest in the Gordon smelter, near Murray, later buying out his partner. Some time afterward, he formed a partnership, with Nash & Barton, of the Omaha & Grant smelting works. In 1898, they disposed of their interests to the American Smelting & Refining Co., when Mr. Hanauer retired from the smelting business.

The Oakley Factory Colony Near Cincinnati

Rapid Growth of This New Manufacturing District—Description of the Triumph Electric & Ice Machine Co.'s Plant

The plant of the Triumph Electric & Ice Machine Co. is one of the five large works that compose what is known as the Oakley factory colony, located at Oakley, a suburb of Cincinnati. Although only organized a few years ago, this colony has grown rapidly and the following concerns have built large plants in this suburb: The Cincinnati Milling Machine Co., manufacturer of milling machines; Cincinnati Bickford Tool Co., manufacturer of metal drilling machines; Cincinnati Planer Co., manufacturer of planers; the Triumph Electric & Ice Machine Co., manufacturer of electric and refrigerating machinery, and the Modern Foundry Co., manufacturer of machine tool castings. In addition to these works, several other plants are being built at Oakley and a number of concerns are contemplating removal to this suburb. The five concerns now comprising the Oakley colony are furnished with heat, artificial light, electricity, compressed air and water from a central power plant, located at the rear of the Cincinnati Bickford Tool Co.'s works and adjacent to the Modern Foundry Co.'s plant, as shown in Fig. 3. The cost of the power plant was approximately $100,000 and the main power units consist of 300-kilowatt, direct current, direct-connected generators, driven by cross compound Corliss engines. The plant is of brick construction and is equipped with mechanical stokers, automatic regulators and facilities for the mechanical handling of fuel and ashes. A 10-ton, 35-foot boom locomotive crane is used to unload coal from the cars into storage bins. A water tank is located at one side of the power plant and delivers water to five mains and to the sprinkler system of the various plants.

Central Power Station.

Electric light and power cables, as well as the compressed air, steam and water mains are carried underground through tunnels to the five separate works. Electric power is supplied at 110 and 220 volts direct current, and compressed air at 90 pounds pressure, while the water for the automatic sprinklers is kept at a pressure of 100 pounds. A night engineer and night watchman are employed. The general arrangement of the five plants with the central power station, is shown in Fig. 3. All of the works have their greatest length north and south and are arranged in parallel fronting on South street, which parallels the tracks of the Baltimore & Ohio railroad. Columbia road parallels the Cincinnati Milling Machine Co.'s plant and the shop of the Modern Foundry Co. on the east, and Madison avenue intersects the crossing of South street and Columbia road a short distance from the Oakley railroad station. The Baltimore & Ohio railroad operates factory specials, both morning and evening, from Cincinnati to Oakley, to accommodate the men employed in these shops. The Cincinnati Street Railroad Co. also maintains a 20-minute service from Cincinnati to its Oakley station. This suburb is located about eight miles from the center of the business district of Cincinnati. The idea of developing this group of machine shops with a central power station was conceived by Fred A. Geier, president of the Cincinnati Milling Machine Co., and is the direct outgrowth of this company's need for a larger plant. The colony was promoted by B. B. Quillen, of the Cincinnati Planer Co.; F. A. Geier, of the Cincinnati Milling Machine Co.; J. C. Hobart, of the Triumph Electric Co., and A. Teuchter and S. Schower, of the Cincinnati Bickford Co. The gray iron shop of the Modern Foundry Co. was the first plant erected in 1907, and it furnishes a large part of the machine tool castings used by the four plants. During the present year, large extensions will be made to the plants

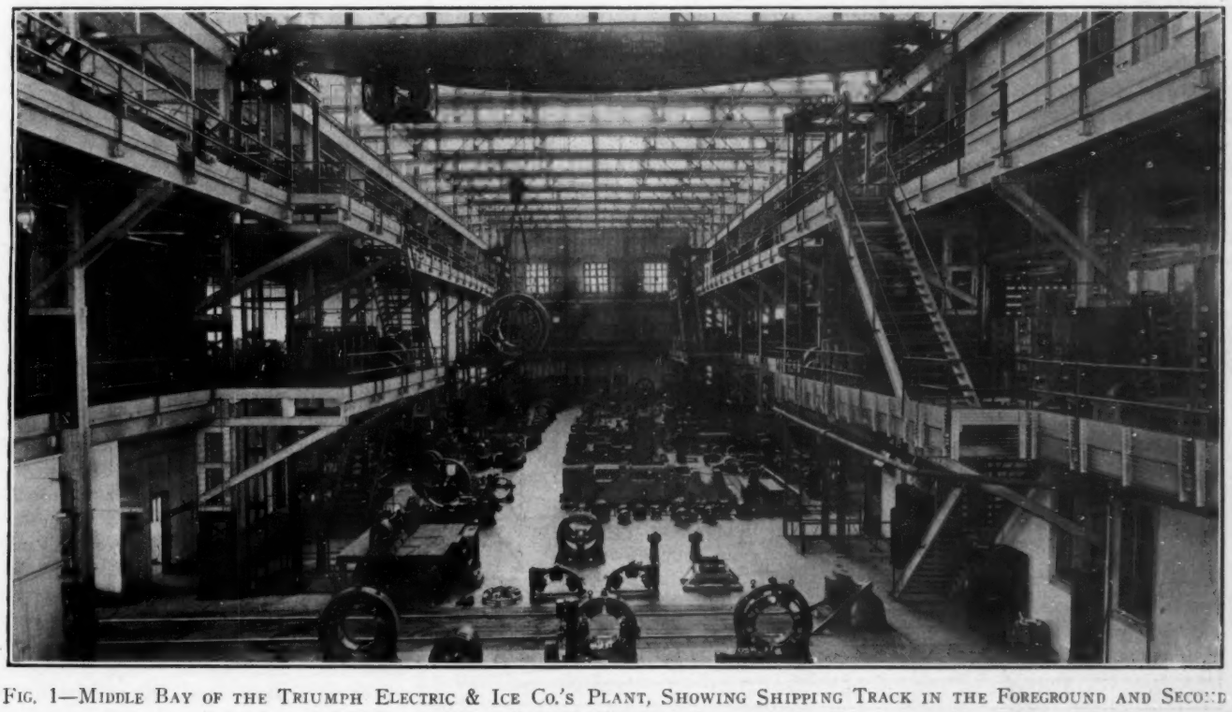


FIG. 1—MIDDLE BAY OF THE TRIUMPH ELECTRIC & ICE CO.'S PLANT, SHOWING SHIPPING TRACK IN THE FOREGROUND AND SECOND GALLERY EXTENSIONS

FIG. 2—ARMATURE WINDING DEPARTMENT, SHOWING LIGHT DISTRIBUTION AND BUILDING CONSTRUCTION

of the Cincinnati Milling Machine Co. and the Modern Foundry Co. The new works of the Cincinnati Bickford Co. have recently been completed.

Triumph Electric Plant.

The plant of the Triumph Electric & Ice Machine Co. is located at the west side of the group, fronting on South street, as shown in Fig. 3. Two buildings have been erected, which are the first of the units of these works. The main building is 300 x 140 feet and the blacksmith and pipe shop is 60 x 200 feet. The buildings are of steel frame construction with brick curtain walls, and a vertical saw-tooth roof covers the middle bay of the main building, which is 60 feet wide. The main building contains approximately 48,000 square feet of floor space, a cross-section of which is shown in Fig. 5. From the floor to the roof trusses, this building is 52 feet high and the crane runway is 44 feet from the floor. The main bay is served by a 25-ton traveling crane, which operates on a 60-pound rail, supported by 24-inch, 72-pound I-beams. The two side bay galleries are carried on 15-inch, 38-pound I-beams, extending lengthwise and spaced on 5-foot, 8½-inch centers and supported by a row of 12-inch columns. Below the second gallery the walls are 14 inches thick and above this point 10 inches thick. For lighting the main bay and the upper galleries on both sides, a 15-tooth, saw-tooth roof, facing north, is trussed over the main bay and extends about 10 feet over the upper galleries. This saw-tooth roof extension and its illumination of one of the upper galleries is clearly illustrated in Fig. 4, which is a view of the electric assembling department. Each tooth of the roof is 20 feet long and 10 feet 6 inches high. The teeth are all vertical, permitting the use of any ordinary sliding or tilting sash without special provision to avoid leakage during rainstorms. The angle at the base of each tooth is approximately 28 degrees. A longitudinal section of the plant, showing the saw-tooth roof construction, is shown in Fig. 6. Composition roofing has been used on the saw teeth and the tops of the teeth are finished with facing caps and cornices. In both ends of each tooth are located 12 x 16-inch, 6-light, pivot-hung windows. As these windows face east and west, they prevent shadows from the other skylights and admit light in the early morning and evening, when the sun is

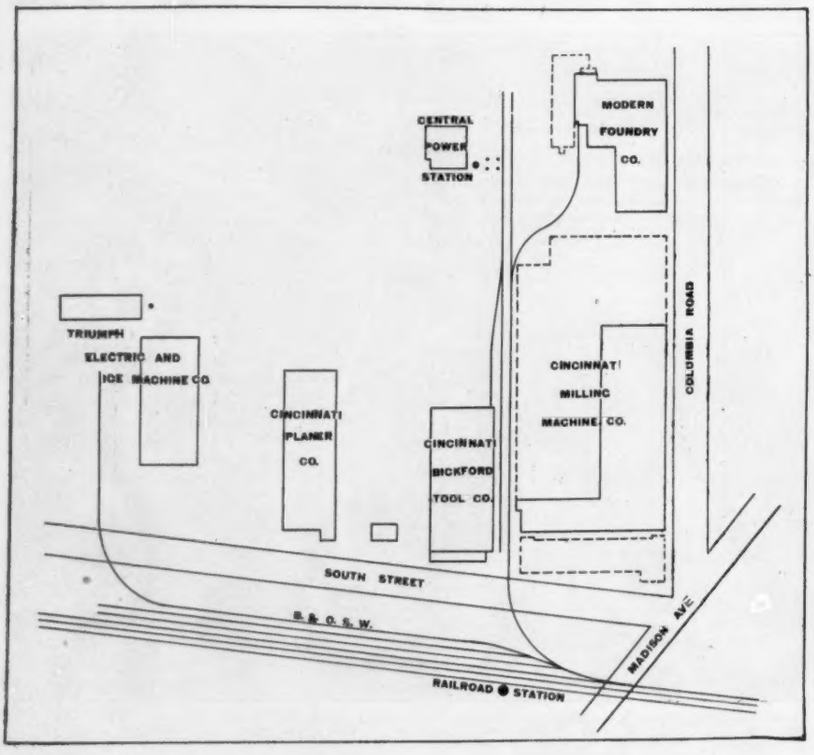


FIG. 3—OAKLEY COLONY, SHOWING THE LOCATION OF THE VARIOUS PLANTS

FIG. 4—A VIEW OF THE SECOND GALLERY OF THE TRIUMPH CO.'S PLANT, SHOWING THE EXCELLENT LIGHT AFFORDED BY THE SKYLIGHTS IN THE SAW-TOOTH ROOF

low. The side walls of the plant are provided with continuous rows of windows containing nine panes per sash and four sashes in each window. The upper windows in the second gallery have six-pane, pivot-hung transoms for ventilating purposes. As shown in the cross-section, Fig. 5, the second gallery extends six feet into the main bay and facilitates the transfer of material from the main floor to the second gallery floor by the traveling crane. To further facilitate the handling of material between the floors, two freight elevators have been installed. In addition to the 25-ton traveling crane in the main bay, a 15-ton crane with a 5-ton auxiliary hoist commands the planer department.

Departmental Arrangement.

As the Triumph company manufactures both electric equipment and refrigerating machinery, the tools for the manufacture of the former are located in the east side of the main building, while the refrigerating machinery is manufactured in the west side. The offices, testing room, tool room, lathe department, heavy machine floor, wash rooms, etc., are located on the first floor. The refrigerating machinery department store room is on the second floor, directly above the machine shop, while stock for the electrical department is stored on the second floor of the west bay. The punching, screw machine and brush holder departments are located on the third floor. All of the small work is done in the small tool department, after which it is delivered to the punching department and then to the brush holder department. On the lower floor the assembling department adjoins the core punching department. The cores after being assembled are transferred to the second floor and are stored either as semi-finished product or are sent direct to the third floor to the armature winding department. The switchboard, commutator and coil winding departments are located on the third floor, directly above the store rooms. The galleries are each 40 feet wide.

Routing the Work.

All rough castings are received at the rear of the plant and are gradually worked forward to the testing department, from which the finished product is loaded into cars by a traveling crane. The heavy beds of ice machines and some of the large spiders for electric generators require a variety of machine work. It is the policy of this shop, wherever possible, to take the tool to the work. Most of the large work is handled on a floor plate by a Morton combination boring mill and draw-cutting machine. A section of this floor plate, showing this combination machine, is illustrated in Fig. 7. This oor plate consists of 15 sections, each 10 feet long and 16 feet wide. Each section weighs 5,600 pounds and the total weight of the plate is 84,000 pounds. Four longitudinal T-slots are provided in each section and the outside edges of the sections contain one-half slot each. The ribs are seven inches deep and the plate is eight inches thick. The plate is double-ribbed at right angles, with the ribs extending crosswise, spaced on 14.4-inch centers and the ribs are spaced 5⅛ inches apart lengthwise of the plate. The T-slots are spaced 14.4 inches center to center,

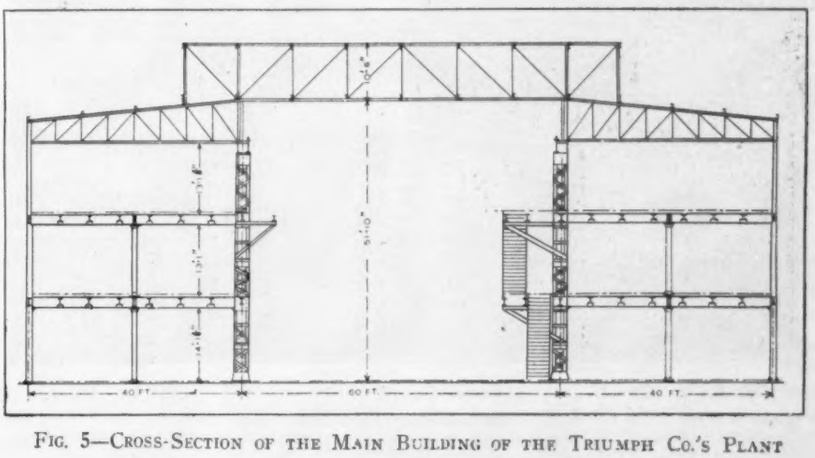


FIG. 5—CROSS-SECTION OF THE MAIN BUILDING OF THE TRIUMPH CO.'S PLANT

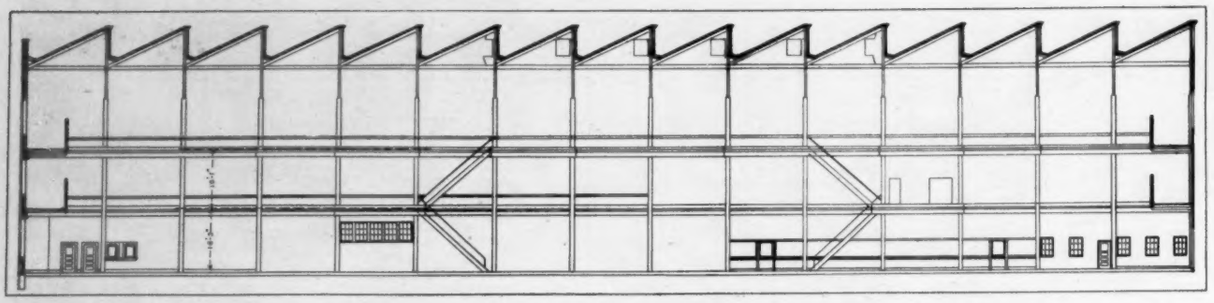


FIG. 6—LONGITUDINAL SECTION OF THE TRIUMPH CO.'S MAIN BUILDING, SHOWING SAW-TOOTH ROOF CONSTRUCTION

with 1⅝-inch holes spaced 15 inches apart, lengthwise of the bars.

The plate is supported on a concrete foundation, five permanent jacks having been used to hold each of the 15 sections. Each jack has a 6 x 12-inch base. When setting the plate sections, they were first leveled on the jacks and concrete was poured into the spaces around the jacks.

When setting work on the plate, a heavy steel square, tongued to fit in the grooves, is used to locate the work or machine with reference to the slots. After the work is in alignment with the plate, it is leveled by setting blocks, jacks and strips, if required. The cutting tool of the Morton combination machine works on the draw stroke, which permits heavy cuts to be taken. In Fig. 7, the tool is operating on a large compressor frame and after shaping out the boxes of the compressor bed, the machine is moved at right angles to the work and the cylinder and circular shoes of the crosshead are bored. This combination machine carries a rotary spindle and boring bar, which practically constitutes two boring heads for facing two surfaces, such as the sleeve casting and crosshead guides of the compressor frame. For carrying castings that are being machined on this plate, a ribbed bar, 96 inches long, 22¾ inches deep and 30½ inches wide, weighing about 9,000 pounds, is used.

For routing the work through the shop, the foreman of each department is provided with a route board. This is provided with a number of vertical sections, each fitted with filing slots or pigeon holes. At the top of each section of the board is designated, either by size, name or machine, the nature of the orders that are to be filled in that section. In these slots are filed the orders for the various jobs for each department as they are received by the foreman. On the shop orders are recorded the quantity, shop number, sizes, etc., of the pieces desired. The data on these orders clearly indicate to the workman what operations are to be performed, thereby eliminating the necessity of consulting the foreman. As the orders in line of preference are arranged in the sections from top to bottom, every job that is to be rushed is moved to the head of the section and will thus automatically receive preference without further attention from the foreman.

In the punching department, the dies are lubricated with lard oil, which is removed from the sheet iron armature cores laminations, by dipping in a solution of boiling potash and immediately plunging them into boiling water, where they are rinsed and later dried. Potash has no deleterious effect on these discs.

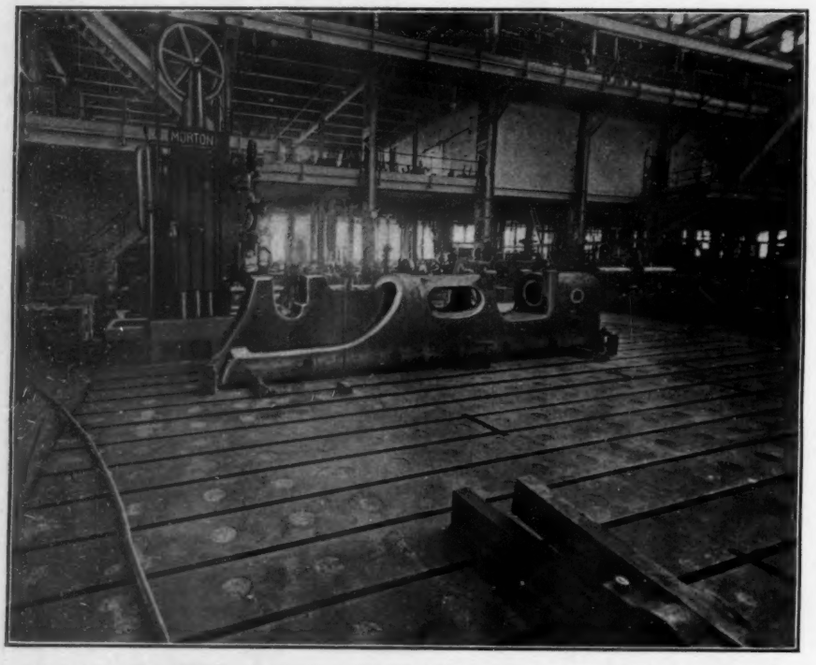


FIG. 7—A SECTION OF THE FLOOR PLATE, SHOWING THE PORTABLE MORTON COMBINATION MACHINE

Blast Furnaces Will Continue in Operation

Respecting a note recently made in THE IRON TRADE REVIEW as to the Alleghany Ore & Iron Co. resuming possession of its Virginia properties at the expiration of a lease to the Oriskany Ore & Iron Corporation, the following additional facts are learned: The company, which is the owner of the Oriskany iron ore mines and Alleghany and Buena Vista blast furnaces, will operate its properties after June 29. The general offices will be located at Iron Gate, Va., but the old Clifton Forge office will be open the remainder of this month. The officers are: President, H. B. Spackman, of the Lukens Iron & Steel Co., Coatesville, Pa.; treasurer in charge of commercial department, R. S. Lackey, Iron Gate; superintendent of mines, John W. Stull; superintendent of furnaces, O. M. Stull. A four months' extension of the lease on the Buena Vista property was made to work up the stock at that plant. The Alleghany furnace at Iron Gate will be continued in blast on the low phosphorus special car wheel, foundry and high manganese pig iron made exclusively from the company's own Oriskany ore. Later, Buena Vista furnace will be operated on the standard low phosphorus high manganese special grades so well known to the trade.

The Production of Pig Iron From 1871 to 1910[1]

The Wonderful Growth and Development of the Iron Industry of the United States in the Last Forty Years

By John Birkinbine

The practical coincidence of the fortieth anniversary, and the one-hundredth technical meeting of the American Institute of Mining Engineers, offers temptation to recall and compare the conditions of mining and metallurgy in or about 1871 and 1911. Since such a resume would necessitate an extended paper, the record of the pig iron industry is here selected as indicative of the progress to which members of the institute have been important contributors.

Some of the notable steps of that progress have been in the introduction of natural gas in the manufacture of iron and steel; the predominant employment of coke as a fuel for blast furnaces; the production of basic steel and the general replacement of iron by steel; the use of mixtures for molten metal; the manufacture of American tin plate; the construction of iron or steel vessels, armor plate, steel cars and structural steel buildings; the installation of pipe lines to convey oil; the utilization of electricity for light and power, and the creation of great industries for the production of cement, and for the manufacture of bicycles, automobiles and the apparatus of aviation.

The application of high pressure steam or air, of water turbines under high heads, of high-speed machinery, of high-temperature blast, and of high explosives, are features of the four decades of the institute's existence; as are also the advances in practical electro-metallurgical processes, and many instances of utilization of by-product or waste material.

Progress in Blast Furnace Practice.

In iron-smelting, regenerative hot blast stoves, by-product coke and charcoal ovens, skiphoists, liberal water-cooling and the dry air blast, are special developments of the same period, contributing to increase of product, decrease of fuel consumption, reduction of labor cost, and control over the quality of the metal made.

It is not necessary to discuss here the details of conversion, manipulation and utilization of the metal. The simple story of the amount of iron ore smelted to produce pig iron between 1870 and 1910 constitutes a sufficient gage of this phenomenal advance, and the fact that in 1871 iron rails commanded $70 and steel rails $102 per ton, while in 1910 no iron rails were produced and the price of steel rails was $28 per ton; epitomizes the change of conditions.

Iron Ore.

The ninth census gave the consumption of iron ore in the United States for the year 1870 as 3,831,891 and the production of pig iron as 1,665,179 long tons. At that time, Pennsylvania headed the list of states, with fully one-third of the iron ore won; but later, Michigan, and subsequently Minnesota, took the lead, the record for 1909 being, Minnesota, 28,975,149; Michigan, 11,900,384, and Pennsylvania, 666,889 long tons, the estimated production of iron ore in the United States in 1910 being 33,500,000 tons.

For 17 years before 1871, the Marquette range in Michigan had been shipping mineral, but the entire output of 1871 (813,379 long tons) was less than the storage capacity in 1910 of the 6,918 pockets in the 29 shipping docks on the great lakes, through which, in that year, 42,619,060 tons of iron ore were loaded into vessels; and the total production of this range for 17 years was less than the output in 1909. Since 1871, the Marquette range has furnished 93,500,000; the Menominee (opened in 1877), 75,750,000; the Gogebic (opened in 1884), 66,000,000, and Minnesota, which up to 1884 had furnished no iron ore, 256,000,000 long tons. In round numbers, the total production of iron ore in the Lake Superior region, to the close of 1910, was about half a billion tons.

Iron ores from the Marquette range of Michigan (the only producing section of the Lake Superior region in 1871) were then principally used to mix with other ores; and the various sources from which ores were assembled at blast furnaces are suggested by the record in 1873, 11 furnaces in Pittsburg and vicinity produced 141,773 long tons of pig iron, and were supplied with ore from the following localities:

	Long tons.
By rail, Lake Superior ores	202,840
By rail, Lake Champlain ores	3,440
By rail, Iron Mountain, Mo., ores	24,580
By river, Iron Mountain, Mo., ores	88,489
Native local ores (mostly carbonates)	1,492
Total	320,841

In 1910, on the other hand, 47 blast furnaces in the Pittsburg district produced 5,330,898 long tons of pig iron from 10,000,000 tons of ore brought from the Lake Superior region, practically a ten-fold increase per furnace, and a total district-output augmented 30 times.

Most of the other Pennsylvania furnaces relied in 1871 on the Cornwall ore banks or local hematites, while some were dependent on carbonates and Clinton ores. In that year, the Lake Champlain region of New York supplied 183,343 tons of iron ore and the New Jersey magnetite mines about 450,000 tons. The annual output of the New York mines now approximates 1,000,000 tons, while there has been little change in the total product of the New Jersey mines. The Ohio furnaces then depended mainly upon local carbonates and Lake Superior ores. Little of the former class is now smelted.

In 1871, the limited amount of ore won in the southern states fed small charcoal blast furnaces; but in 1910, Alabama alone made 1,939,147 tons of pig iron, and the iron ore output of Virginia, North Carolina, Georgia, Alabama and Tennessee now approximates 6,000,000 tons.

The growth of a magnificent industry at cities on or close to the great lake system, the establishment of iron and steel industries in Alabama and Colorado, and the enlargement of others elsewhere, fall within the interval here contemplated.

Pig Iron Output in 1910.

The record of the important pig iron producing states in 1910 was: Pennsylvania, 11,272,120; Ohio, 5,751,067; Illinois, 2,675,646; Alabama, 1,939,147; New York, 1,938,407, and other states, 3,722,158; total, 27,298,545 long tons.

The relative positions of the United States and other nations are shown in the following table which indicates that in 1871 England held first place, followed by the United States and Germany, but at the present time the output of both the United States and Germany has exceeded England; in fact, the United States has sur-

[1]Read before the American Institute of Mining Engineers at the Wilkes-Barre meeting, June, 1911.

passed the combined output of Germany, England and France:

Production of Pig Iron.

	Long tons.			
Great Britain	6,627,179	(1871)	9,531,987	(1909)
Germany and Luxemburg	1,563,682*	(1871)	14,793,325*	(1910)
United States	1,706,793	(1871)	27,298,545	(1910)

*Metric tons.

Notwithstanding the establishment of new iron and steel producing centers in other states, Pennsylvania has continued to be the largest contributor of metal. No country in the world, except Germany and Luxemburg combined, made in 1910 as much iron as this state, and the Pittsburg district was exceeded by no foreign nation except Germany and Luxemburg and Great Britain, notwithstanding the circumstance that it draws the greater part of its ore supply from sources 800 to 1,100 miles distant.

The production of pig iron by nations and by states could be followed into districts, and the change of status emphasized; for new producing centers have been added and some old ones have increased in output, while others have been stationary, and a few have show a decadence. The important factors in these changes have been:

The improvements in transportation, which, by increasing the carrying capacity of vessels and cars, and the efficiency of mechanical handling in loading, unloading, and transfer, have largely eliminated the influence of distance.

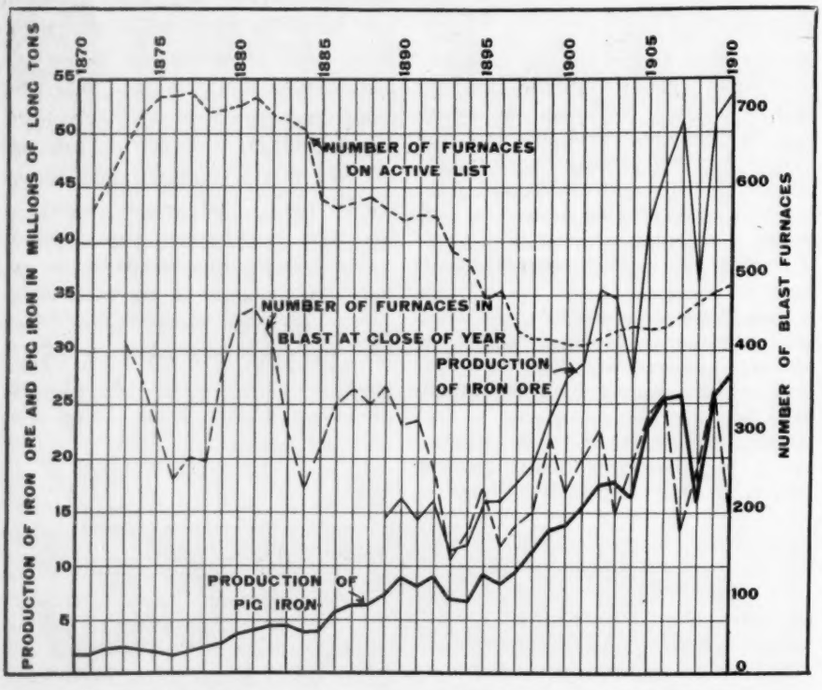
The concentration of industries under central management.

The demand for material in newer sections of the country, creating market centers from which the products of furnaces and mills are distributed.

The increased available supply of labor, largely of a skilled character, demanded by the mechanical equipment connected with mines and furnaces.

When the handful of men who, recognizing the advantage of mutual help and interchange of knowledge, assembled in Wilkesbarre, in May, 1871, to organize the institute, the predominant blast furnace structure was a truncated square pyramid of stone masonry, lined with refractory brick or stone, the crucible often being formed of stone neatly dressed to shape. From the throats of many furnaces the hot gases, meeting the air, became flame, pulsating with the action of the blast apparatus and illuminating the surrounding country. Some of the newer furnace stacks, however, were cylindrical shafts of brick held by bands or shells of metal, and supported on masonry piers or metal columns, the top being closed with bell and hopper.

Many furnaces were fed by runways leading to a leveled stockyard built into an adjacent side hill; others employed inclined planes and a comparatively small number used vertical hoists, sometimes water-ballasted, to raise stock from the working level of the plant. Iron hot-blast stoves or long cylindrical boilers (sometimes both) were supported upon costly masonry piers and arches, to facilitate the diversion of the gases from the furnace top or hot-blast stoves.



RECORD OF THE IRON INDUSTRY OF THE UNITED STATES, 1870 TO 1910

Early Blowing Equipment.

While some excellent examples of steam blowing machinery were in use, the prevailing types were horizontal blast cylinders, operated by spur gearing from a horizontal steam engine, or vertical blast cylinders operated by beam engines of long stroke and large cylinder diameter, the air cylinders reaching dimensions of 9 feet diameter and 9 feet stroke, and the majority of the blowing engines being operated without condensers. At some important plants, water wheels furnished the power, and among the charcoal furnaces there were examples of wooden blowing tubs and receivers, the pistons of which were driven by overshot or breast waterwheels. In the larger furnaces, the general working limit of blast pressure was 5 pounds per square inch, and if this pressure were doubled, the machinery would be stalled, or the manager would endeavor to loosen up the stock by reducing the burden.

An output of 30 tons per day was considered satisfactory for an average furnace, and the weekly production of 300 tons was sufficient to excite comment. In 1878, the record of 100 tons of pig metal produced by a single blast furnace in a day, startled metallurgists throughout the world. Closed fronts were a new feature. As a rule, the fluid metal and cinder accumulated in a fore-hearth, the latter overflowing from under a removable plate, and furnaces were worked periodically, to remove accumulations of unconsumed fuel, ash and dirt.

Railway cars of from five to ten tons capacity, delivered the raw material to the more important plants, although some depended largely upon canal transportation, and many charcoal furnaces relied solely upon wagon haul for raw material and product.

Early Charging Methods.

In some large furnaces, masses of coal, ore and limestone, limited only by the ability of the fillers to handle them, were fed into the tunnel heads, and little attention was given to preparing stock, except at charcoal plants. The filling of charging barrows and their discharge into the furnace was done by manual labor and the casting and breaking of pig iron demanded a force which practically dominated the operation of the plant; for pig iron was cast in sand beds or chills, broken and removed by hand,

and cinder was carried away in carts or tram cars.

In 1870, one-half of the pig iron product of the United States was made with anthracite coal, 30 per cent with raw bituminous coal and coke, and 20 per cent with charcoal; but within five years thereafter, the proportion made with bituminous coal and coke exceeded that obtained with anthracite, and it subsequently increased until, in 1910, the pig iron output of 27,298,545 long tons was divided into 26,255,086, or 96.2 per cent made with coke, 649,082, or 2.4 per cent made with anthracite, and 394,377, or 1.4 per cent made with charcoal.

To the production of pig iron should be added that of blooms, averaging about 60,000 tons per year. In 1871, these were made in charcoal-bloomeries from magnetite; but charcoal-blooms are now made from scrap only.

The organization of our institute occurred at the time when the manufacture of iron was in a state of transition, when the older constructions were being displaced by those of newer design, and the theory of smelting was being scientifically investigated. The situation was epitomized by E. C. Pechin, who said, in a paper on "The Position of the American Iron Manufacture", read at the Pittsburg meeting of October, 1872:

The time has come when scientific research is to assume its true position. The day of "sheer force and blind stupidity", whose only protection was a high tariff, has gone by forever. The prodigal waste of the rich gifts of nature; the vast sums of money thrown away; the hard labor, in the aggregate too large to be even approximately estimated, which has been uselessly expended; the mishaps, drawbacks, and failures which have followed every step of our business, show most conclusively that the physicist, the geologist and mineralogist, the chemist, the engineer and mechanic are as essential to success as the furnace itself, or the labor that works it. . . . . Eternal vigilance is the price of pig iron.

Blast Furnace Construction.

In the period under contemplation, there have been radical changes in the shape and proportions, equipment, appliances and location of blast furnaces. The low, flat bosh and narrow crucible were gradually changed, until the no-bosh furnace was suggested; and subsequently the very steep slope of boshes gave place to large hearth and moderately flat boshes. The height of furnace, which became excessive, exceeding 100 feet, has settled down to more moderate dimensions. The number and size of tuyeres were augmented and economical blowing apparatus was designed to meet the greater demands of volume and pressure. The removal of ore and coke dust from blast furnace gases and the cleansing and utilization of these, together with the recovery of the mineral producing dust, and the employment of gas for operating blowing machinery and other purposes, as well as the conversion of cinder into cement, and the use of gas from by-product ovens, deserve attention in this connection.

Early and Present-Day Production Compared.

Our comparison of the iron ore and pig iron industries of 1871 with those of the present day may be emphasized by the mention of some features of special and dramatic interest, such as:

The production in one year from a single mine in Minnesota of 3,000,000 tons of iron ore—an amount practically equal to 80 per cent of the entire output of all domestic mines in 1871.

The practice of digging ore by powerful steam shovels in large areas, from which 100 feet or more of overburden has been stripped; the shipment of this ore (or of ore mined from deep shafts with powerful hoisting machinery, and shipped either as mined or after treatment in mechanical separators and nodulizing or sintering furnaces) in long trains of 50-ton dump-cars and its transfer into vessels through numerous dock pockets holding 200 to 350 tons each, at a rate which has sometimes exceeded 10,000 tons per hour.

The swift voyages of such vessels to receiving ports and return; the discharge of cargo by mechanical appliances at the rate of 2,000 tons per hour, and the conveyance of the mineral in 50-ton cars to blast furnaces.

The accumulation at iron producing plants of stock piles, sometimes exceeding a million tons, to be fed to a battery of blast furnaces at the rate of several thousand tons per day.

In the series of operations thus outlined, much of the ore is never touched by the miner, shipper, laborer, or furnaceman, from the time it leaves its natural bed until, with corresponding quantities of flux and fuel, it enters into the charge of the modern blast furnace, the product of which averages ten times that of the larger furnaces in 1871. Indeed, a considerable portion of the iron ores now smelted are not touched by the hand of man until, after passing through the blast furnace, being handled by ladle cars in a molten state to casting machines, mixers and converting plants and mills, they become finished merchantable products.

Total Number of Blast Furnaces in the United States on Dec. 31, of the Following Years, with Domestic Production of Pig Iron and Iron Ore.

Year.	Number of existing blast furnaces.	In blast at close of year.	Quantity of pig iron produced, tons.	Quantity of domestic iron ore produced, tons.
1871	571	no record	1,706,793	*3,831,891 (1870)
1872	612	no record	2,548,713	no record
1873	657	410	2,560,963	no record
1874	693	365	2,401,262	no record
1875	713	293	2,023,733	no record
1876	712	256	1,868,951	no record
1877	716	270	2,066,594	no record
1878	692	265	2,301,215	no record
1879	697	388	2,741,853	no record
1880	701	446	3,835,191	*7,120,362
1881	716	455	4,144,254	
1882	687	417	4,623,323	
1883	683	307	4,595,510	
1884	669	236	4,097,868	
1885	591	276	4,044,526	
1886	577	331	5,683,329	
1887	583	339	6,417,148	
1888	589	332	6,489,738	
1889	570	344	7,603,642	14,518,041
1890	562	311	9,202,703	16,036,043
1891	569	313	8,279,870	14,591,178
1892	564	253	9,157,000	16,296,666
1893	521	137	7,124,502	11,587,629
1894	511	185	6,657,388	11,879,679
1895	468	242	9,446,308	15,957,614
1896	470	159	8,623,127	16,005,449
1897	423	191	9,652,680	17,518,046
1898	414	202	11,773,934	19,433,716
1899	414	289	13,620,703	24,683,173
1900	406	232	13,789,242	27,553,161
1901	406	266	15,878,354	28,887,479
1902	412	307	17,821,307	35,554,135
1903	425	182	18,009,252	35,019,308
1904	429	261	16,497,033	27,644,330
1905	424	313	22,992,380	42,526,133
1906	429	340	25,307,191	47,749,728
1907	443	167	25,781,361	51,720,619
1908	459	236	15,936,018	35,983,336
1909	469	338	25,795,471	51,294,271
1910	473	206	27,298,545	53,500,000 (estimated)

The number of blast furnaces and production of pig iron are from the reports of the American Iron and Steel Association, and the iron ore data is mainly from the statistical reports of the United States Geological Survey.

*Census figures.

Future Outlook.

The wonderful developments of the past 40 years naturally suggest speculation as to the future. It may be that the manufacture of iron and steel is now entering upon an era of radical departure from present practice. The use of electricity for smelting, the advance in the magnetic separation of

ores, and the nodulizing or sintering of fine material, suggest that some ores now considered undesirable will be in demand, and that deposits now known, but unwrought, will be exploited. Moreover, the large deposits of iron ore in Cuba and Norway which require treatment, and those from other countries which reach our ports, indicate a probable revival of the iron industry of our eastern states, where such a liberal market exists. The use of dry air blast and of blast furnace gases, the recovery of waste, the increase in economy of machinery employed, and the extension of labor-saving auxiliaries to plants, encourage the hope of a continued production of iron at low cost, while the growing demand for ferro-allovs may develop a radical departure from the present accepted design of plant.

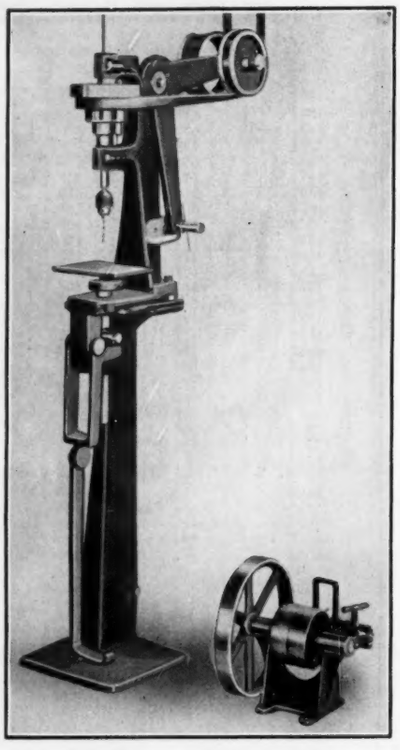
To illustrate graphically the changes in our pig iron industry during the last 40 years, the accompanying diagram has been prepared, in which the ordinates represent years, and the abscissa show on the right the number of blast furnaces, and on the left the production of domestic iron ore and pig iron in millions of tons. The upper curve indicates the number of blast furnaces reported as active or ready for operation in each year; but it should be remarked that the unwillingness of owners to report a plant as abandoned, makes this number greater than the facts really warrant. While the lower curve shows the number of furnaces in blast at the end of each year, the true condition would in most cases be between the two curves. The decrease in the number of furnaces and the coincident increase in the annual production of pig iron are thus illustrated.

The production of domestic iron ore and pig iron show approximately the relations which the raw material bore to the product, but to the quantity of ore should be added mill cinder, scale, etc., and imported iron ore, the latter ranging from 180 to more than 2,000,000 tons per year. To assist in studying this diagram the figures and quantities are given in the accompanying table.

The Shanafelt Mfg. Co., Canton, O., manufacturer of pattern shop and foundry supplies, has closed negotiations with Hammacher, Schlemmer & Co., Fourth avenue and Thirteenth street, New York City, whereby this concern will act in the capacity of eastern agents and will carry a stock of the entire line of products manufactured by the Shanafelt company. A branch office has also been established in the Western Union building, Chicago, under the management of Willis C. Squire.

High Speed Drill

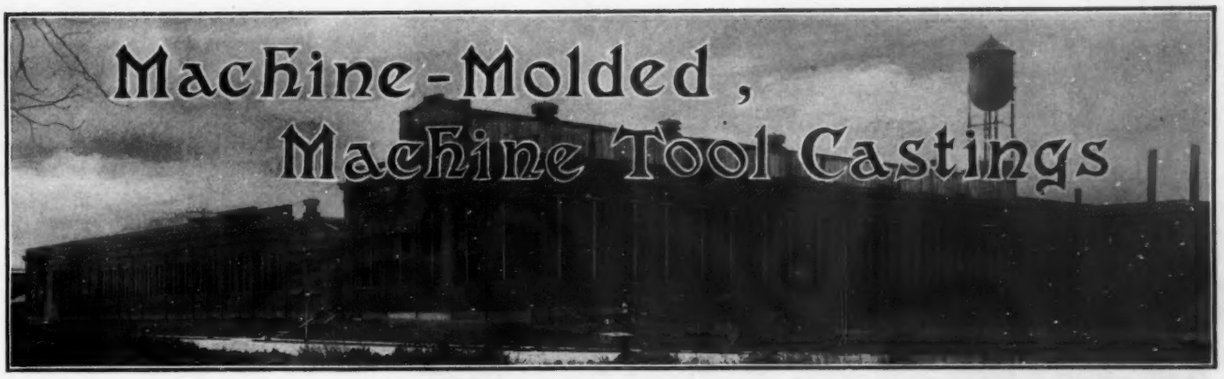
The high-speed drill press, shown in the accompanying illustration, built by the H. P. Townsend Mfg. Co., Hartford, Conn., is adapted for general lock and hardware works, drilling small machine parts and other miscellaneous small work. One of the features of this drill is the location of the speed change mechanism, which permits the operator to make the necessary speed changes while seated at the machine. Another interesting feature is the foot lever, which operates the table and raises the work to the drill, thereby enabling the operator to control his work with both hands. This foot lever is claimed to be as sensitive as the hand lever, as the weight of the foot is entirely at rest and a very easy, swinging motion, which requires practically no effort, permits the operator to feel the drill as easily as with the hand lever spindle. The table is so designed that jigs may be fastened in any position. The spindle is adjusted to various positions by a split binder inside of the cone pulley, which is released or tightened by a spanner nut. The plunger which carries the table is adjustable, so that with the adjustment possible on the spindle and plunger, work of various heights, up to six inches, may be accommodated. The table has a movement of about 1½ inches, which covers all ordinary requirements. To insure the squaring of the table with the spindle, the spindle holes and the holes which carry the plunger supporting the table are bored in line and the table is faced off by swinging up the plunger in the center rest of a lathe, which brings all points at the surface at right angles to the plunger and, therefore, to the spindle. The table, when worn, may be faced off in this way. The spindle does not slide and is, therefore, perfectly balanced. The spindle bearings are made of cast iron and after being reamed, the surface is impregnated with finely divided graphite, which extends from 0.010 to 0.015 inch below the surface and prevents the cutting or heating of the spindle at high speeds. The cone pulley is made very heavy and weighs about 20 pounds. This weight insures steady operation. The steps of the cone pulley vary from 2⅝ to 6¾ inches in diameter. The power is ample to carry a ½-inch drill, as the belt used runs from the cone pulley direct to the countershaft overhead. The idlers are of large diameter and the distance between centers is sufficient to overcome any difficulties resulting from the belts not wearing uniformly. The machine is furnished on the stand or for bench use, as desired. Several heads may be set in a row and weight feeds may be applied, which, with the high speeds possible in drilling brass will not break the drills as they cut through the work. The table is 6 x 8 inches in size.



High-Speed Drill Press

Will Install Turbo-Blowers

The Colonial Iron Co. has closed a contract with the General Electric Co. for the installation at its new blast furnace plant, at Riddlesburg, Pa., of a turbo blowing unit, similar to that which the latter company recently put in operation or is now building for different blast furnaces. The unit to be installed at Riddlesburg consists of an air compressor driven by a Curtis steam turbine and will have a capacity for blowing 25,000 cubic feet per minute. The installation in its main particulars will follow those of this equipment now in operation at the Oxford, N. J., furnace of the Empire Steel & Iron Co., and at the Port Henry, N. Y., furnace of the Northern Iron Co., but will have some minor features of difference in accordance with the special requirements of the new Colonal furnace, which is a stack of 18-foot bosh. The adoption of this blowing method at Riddlesburg will make this installation the sixth of its kind in operation or arranged for in this country. In addition to the Oxford and Port Henry furnaces, the new plant of the Iroquois Iron Co., at Chicago, is to be equipped with three of these blowers.



Description of the Modern Foundry Co.'s Plant

Gray Iron Shop Which Furnishes the Castings to the Machine Tool Works Comprising the Oakley Colony

At Oakley, a suburb of Cincinnati, is located the Modern Foundry Co.'s gray iron shop, which is a subsidiary plant of the Cincinnati Milling Machine Co. The machine tool builders of the Cincinnati district, until recent years, purchased their castings largely from local shops and from foundries in southern Ohio, as it was claimed that the castings could be purchased from jobbing foundries at prices below the manufacturing cost of these sections when made in plants devoted to these castings entirely and operated by the machine tool builders. It was believed, however, that a large foundry especially equipped with labor-saving devices for the manufacture of machine tool castings, might effect economies that were not possible in some of the jobbing shops engaged in this line of work, and this led to the erection of the Modern Foundry Co.'s plant by the Cincinnati Milling Machine Co. In addition to furnishing castings to the parent concern, other manufacturers comprising the Oakley colony, draw upon this foundry for their gray iron sections.

The foundry is divided into six departments under one roof, the general layout being L-shaped. The plant is located several hundred feet in the rear of the works of the Cincinnati Milling Machine Co., and the Oakley central power station is located directly in back of the foundry. The general layout of the shop is shown in Fig. 10. In common with all the other Oakley plants, the power station furnishes the foundry with steam heat, water, compressed air, electric power, etc., the different lines being laid in a concrete, underground tunnel. Fire protection is afforded by an automatic sprinkler system. Direct current motors are used for operating the blowers, sand conveyors, riddles and cranes, while compressed air is used for operating the molding machines and for furnishing the air to oil burners installed by the Hauck Mfg. Co., Brooklyn, N. Y., which are used throughout the shop for skin-drying molds. Sanitary drinking fountains of the bubbling type are distributed throughout the entire plant, and shower baths, lockers and wash rooms are also provided for the comfort of the employes.

The buildings are of brick construction trimmed with stone. The foundry is 70 feet wide and 220 feet long and at one end of the shop is located the melting department. The charging floor is 160 x 22 feet. The core department is located directly underneath the charging floor and the core ovens are built outside of the foundry with doors leading into the shop. The iron is melted in two cupolas lined to 54 and 36 inches, respectively. The blast is furnished by a Pjqua blower driven by a 30-horse-

FIG. 1—GENERAL VIEW OF THE MODERN FOUNDRY CO.'S GRAY IRON FOUNDRY; ONE OF THE SAND CONVEYORS EXTENDS ALONG THE WALL AT THE RIGHT

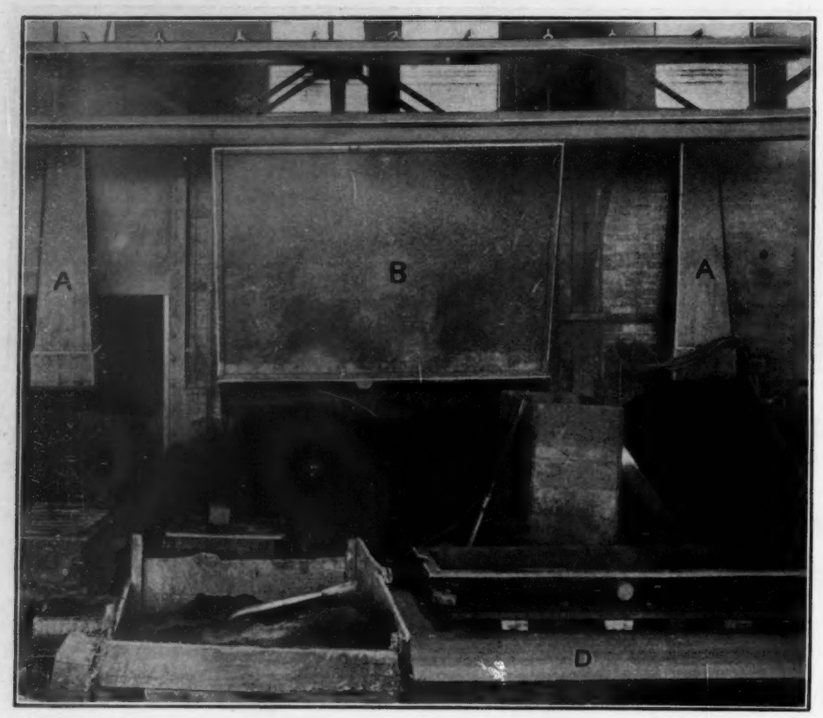


FIG. 2—TWO SMALL SAND HOPPERS ARE SHOWN AT *A* AND A LARGE SAND HOPPER AT *B*

power motor. Large flasks are stored in the yard at the rear of the foundry.

Practically all of the molds for machine tool castings are machine made. The machines for medium and light work are arranged along the wall at one side of the shop. A variety of molding machines have been installed, and these include split pattern, plain power-ramming, roll-over and stripping plate types furnished by the Tabor Mfg. Co., Philadelphia, the Osborn Mfg. Co., Cleveland, and Henry E. Pridmore, Chicago. In the other side of the shop large molds are rammed by jolt-ramming molding machines, furnished by the Arcade Mfg. Co., Freeport, Ill., and the Herman Pneumatic Machine Co., Zelienople, Pa. Boards and flasks for the small casting floor, that are not in constant use, are stored in the yard and great care is exercised to arrange the flasks according to size and form. All bottom boards are stacked in rows and each pile is designated, showing the sizes of the boards. For convenience in handling and to reduce the space required for storing the flasks used on the molding machines, the pipe handles are removed from the flasks and are only inserted when the flasks are used. The standard flasks for light work are 22 x 16 inches and 6 inches deep. Lugs are provided on the sides of the flasks for holding the handle bars. The light casting department is commanded by two hand-operated travelers, equipped with air hoists. The main bay is served by three electric traveling cranes, having a span of 40 feet.

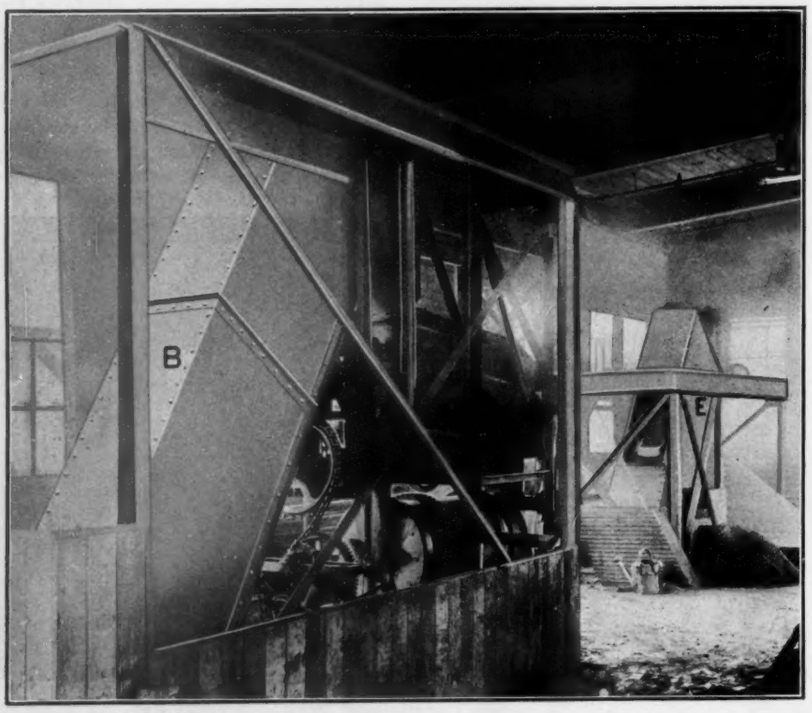


FIG. 3—SAND-PREPARING PLANT ON THE CHARGING FLOOR

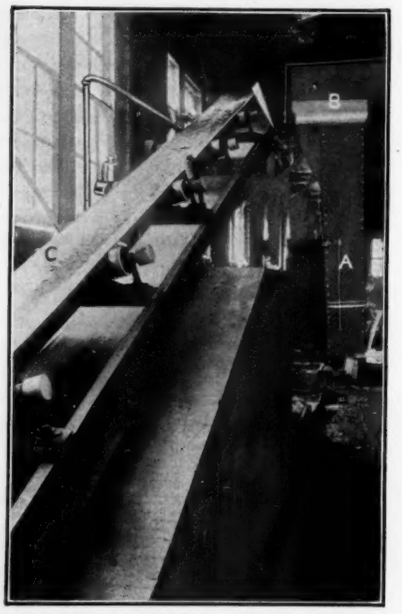


FIG. 4—BELT CONVEYOR FOR CARRYING NECESSARY SAND TO THE SAND MIXING PLANT

In the core department a jolt-ramming molding machine is used for making practically all of the large cores, as shown in Fig. 5. The core boxes filled with sand are handled by electric hoists, being supported by a double pair of hooks attached to a double-end bar, which engages the crane hooks. When ramming a core, these hooks are removed by slightly lowering the crane hook, but they are left in position so that the core box can be properly lifted from the table when the core has been rammed. The machine is surrounded by a concrete platform which extends about

8 inches above the core room floor. In addition to the two large core ovens shown in Fig. 6, four small ovens have been installed for light cores. The method of handling core plates by an electric hoist is clearly shown in Fig. 6.

Sand-Handling Equipment.

Sand is delivered to the various molding floors by sand conveyors installed by the Jeffrey Mfg. Co., Columbus, O. Two 12-inch scraper conveyors extend along the walls on either side of the building and discharge sand into small storage hoppers over each molding machine and bench. The sand conveying apparatus has a capacity of about 10 tons per hour. One of the sand conveyors is clearly indicated at the left in Fig. 1, which also shows the chutes through

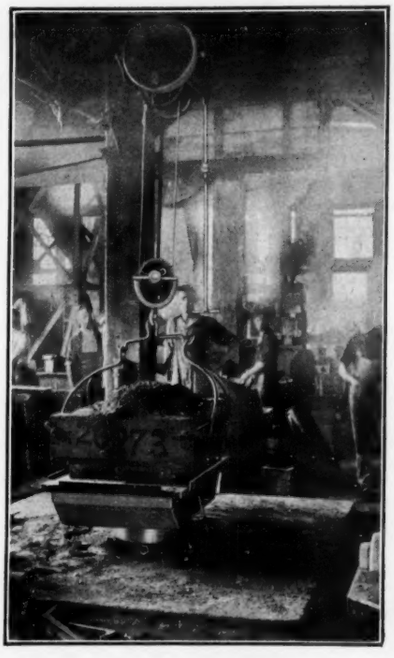


FIG. 5—JOLT-RAMMING MACHINE FOR RAMMING LARGE CORES

which the sand is delivered to the molding floors. In Fig. 2 are shown small hoppers at *A* and *B* is the large sand hopper which serves one of the jolt-ramming molding machines, the table of which is indicated at *D*. Each scraper conveyor extends the full length of the shop at a height of about 10 feet from the floor. Each conveyor is operated by an electric motor, this operating mechanism being shown in Fig. 9. A railing and walk extends the full length of each conveyor for the convenience of the workman in charge of this equipment. Fifteen sand hoppers are provided on the small molding machine floor, while in the jolt-ramming machine department there are 12 sand hoppers. The

FIG. 6—A VIEW OF THE CORE DEPARTMENT, SHOWING THE CORE CARS AND THE LARGE CORE OVENS

small sand hoppers are of steel construction, squared at the base and are reinforced at the lower edge for the adjustment of a wooden plate for closing the hopper if desired.

The flasks are shaken out by a night gang, which also mixes and tempers the sand. The sand, when shaken out of the flasks, falls through gratings in the foundry floor into 12-inch belt conveyors, located on either side of the industrial track extending through the middle of the foundry, as shown in Fig. 1. The sand is con-

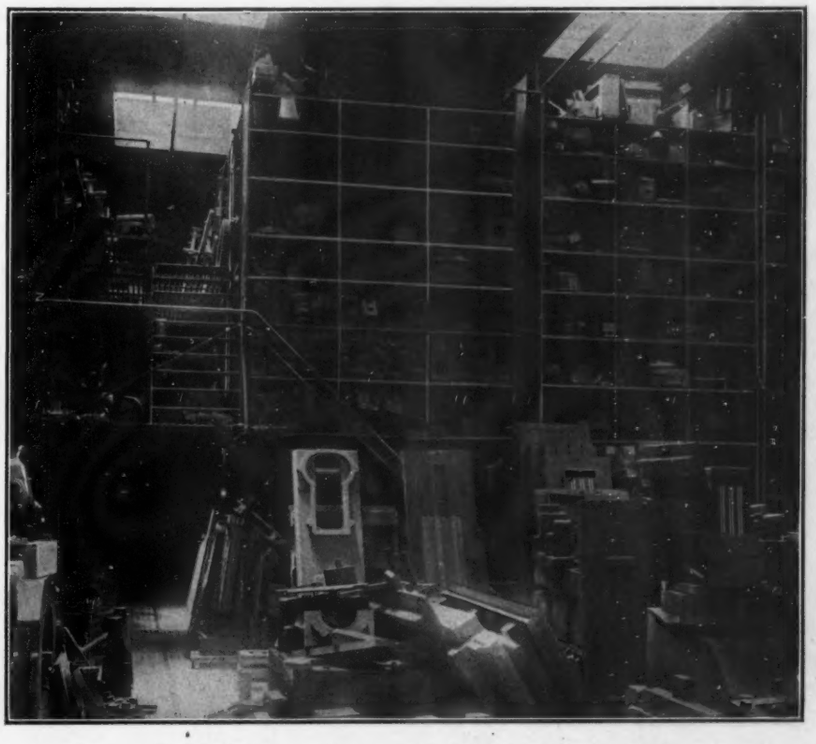


FIG. 7—PATTERN STORAGE, SHOWING STEEL SHELVING

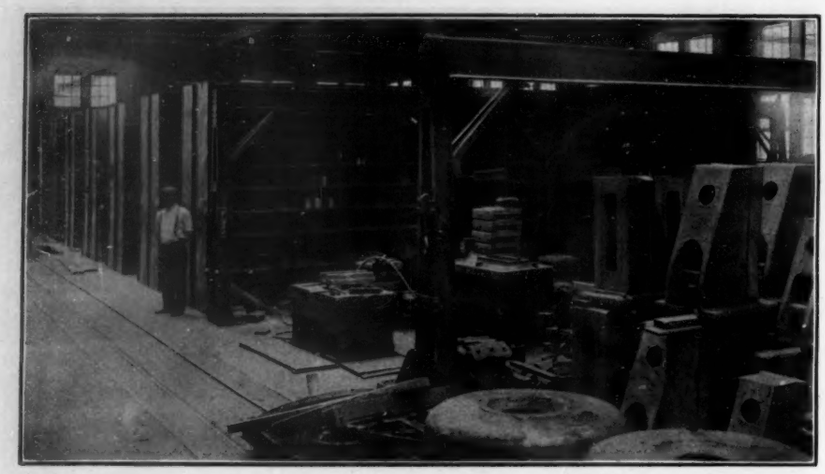


FIG. 8—CASTING STORAGE DEPARTMENT PROVIDED WITH STEEL BINS FOR STORING SMALL CASTINGS

veyed to the sand-preparing plant, located on the charging floor, as shown in Fig. 3. At *A*, Fig. 4, is shown one of the conveyor enclosures, and this conveyor delivers the sand to the sand-mixing machine shown in Fig. 3. The sand after being riddled, falls into a revolving drum, where it is tempered and then passes through the chute into the receiver of the belt conveyor shown at *B*, Fig. 4. At *E*, Fig. 3, is shown the spout of the core sand conveyor; the core sand is mixed by hand. The sand is stored in a building adjoining the foundry and the necessary sand is delivered to the mixing plant on the charging floor and to the scraper conveyor by a belt conveyor, *C*, Fig. 4, which operates at right angles to the scraper conveyors. In the sand storage building, a short horizontal belt conveyor is used to deliver the sand to the conveyor, *C*, Fig. 4. The sand is dumped directly from cars into pits and is conveyed to the foundry by the belt conveyors.

For conveying patterns from the pattern shop and pattern storage to the foundry, and for delivering castings from the foundry to the cleaning, casting, storage and shipping departments, an industrial railway system has been installed. The pattern storage room is at the rear of the pattern shop and all patterns are carefully inspected and repaired if necessary before being stored. The pattern storage is 60 x 80 feet, of brick construction with a concrete roof and is lighted by skylights in the roof and is without windows in the walls. A section of the pattern storage is shown in Fig. 7, and it will be noted that steel shelving is used throughout. The small patterns are stored in the upper compartments, while larger patterns are placed in the lower compartments. All of the shelves and compartments are numbered and the patterns are correspondingly indicated. Although the bins are adjustable in height, they are fixed in length and

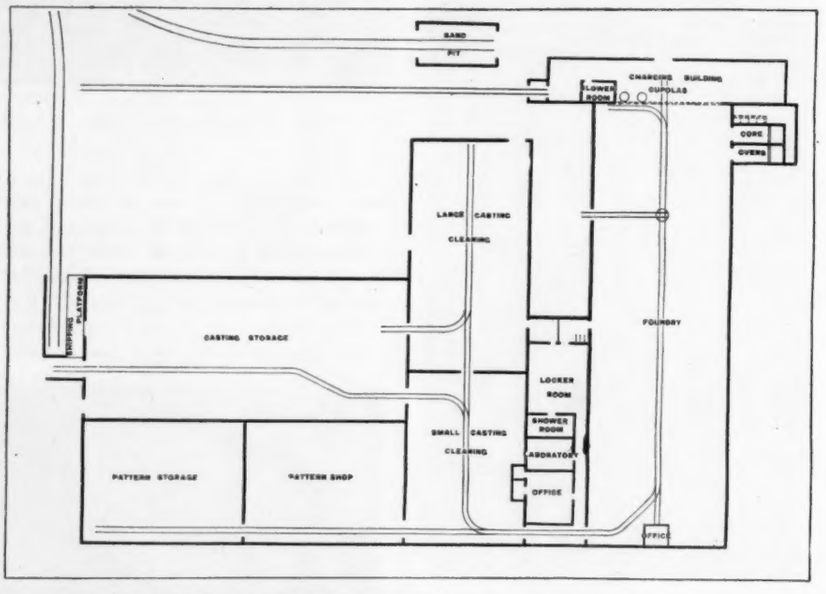


FIG. 10—GROUND PLAN OF THE MODERN FOUNDRY CO.'S PLANT

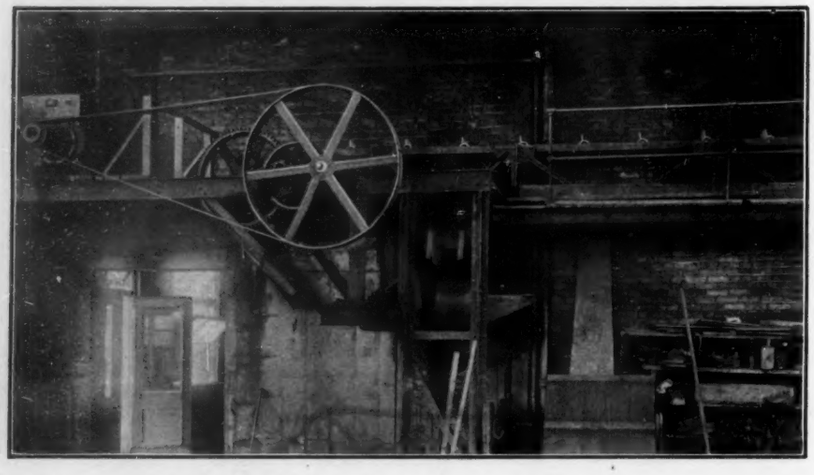


FIG. 9—MOTOR DRIVE FOR ONE OF THE SAND CONVEYORS

width, being 36 inches wide and 38 inches long. The lower gallery has three and the second gallery four rows of shelves. An iron stairway leads up to the second and third galleries.

All patterns rammed on the jolt-ramming molding machines are mounted on boards built up of 2-inch white pine lumber extending lengthwise of the pattern. Five 3½ x 5-inch battens are fastened crosswise of the board by lag screws set in from the upper side. The ends of the battens are protected by 2-inch steel angles. The lower edges of the board are protected against wear due to clamping, by a 1¼ x 3½-inch oak strip. Through the center of each board on the upper side a ½ x 3½-inch steel bar is set in flush with the

face and is bolted through the battens. Guide pins are attached to either end of the board and four iron plates are set in the four corners of the board to resist the wear of the iron flasks against the board. Milling machines, columns, motor frames and similar work are successfully molded on the jolt-ramming machines.

The cleaning department is 200 x 60 feet and parallels the foundry. Castings are delivered to this department from the foundry, over an industrial railway track. The cleaning equipment consists of a sand blast, tumbling barrels, pneumatic chipping hammers, etc. From the cleaning department the castings are delivered to the storage department, from which they are taken to the shipping department when required. The industrial track in the cleaning department is depressed and the floor of the car is on a level with the cleaning room floor. Small castings are stored in steel bins, as shown in Fig. 8. In addition to the industrial track, which delivers the castings from the cleaning department, the casting storage is commanded by a 6,000-pound Pawling & Harnischfeger crane.

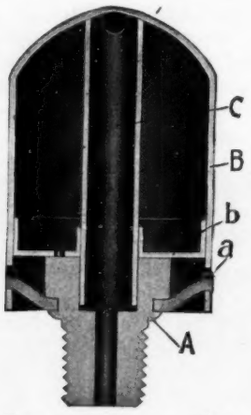


FIG. 1—SECTIONAL VIEW OF LOOSE PULLEY OIL CUP

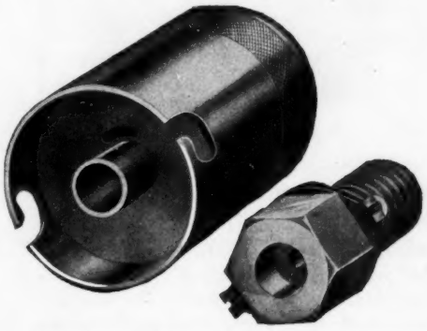


FIG. 2—OIL CUP DETACHED FROM NIPPLE FOR FILLING

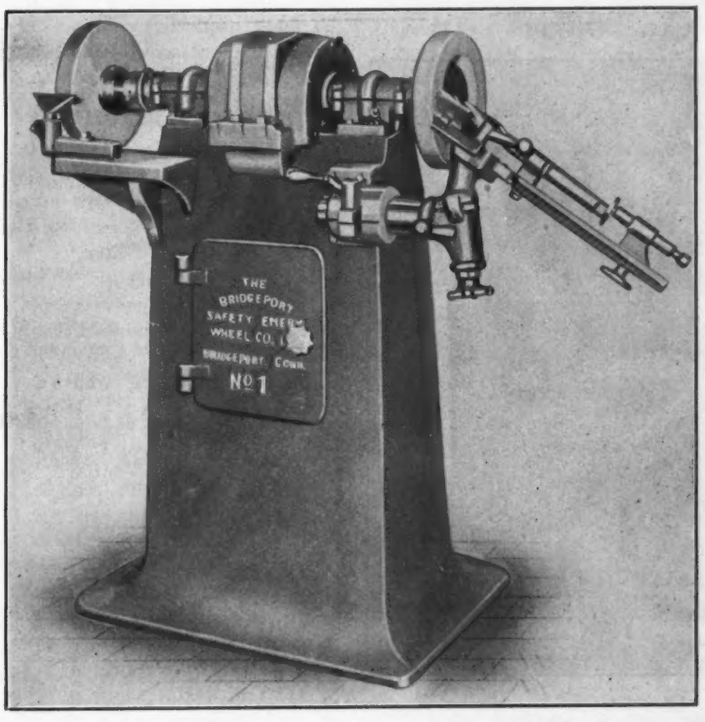
In the foundry the piece-work system prevails and the molders are engaged in ramming molds throughout the day, and the castings are poured, shaken-out and the sand is tempered by a night gang. The perpetual inventory system has been installed and in estimating castings, all items such as coke, pig iron, raw materials and labor are charged against separate orders, while items such as core oil, chaplets, etc., are figured on a tonnage basis.

A Loose Pulley Oil Cup

A loose pulley oil cup, in which the oil is carried to the top of the cup and fills the feeding tube by centrifugal force, is shown in the accompanying illustrations. In Fig. 1 is shown a sectional view of the cup, and when adjusting it to the oil hole in the tube of the loose pulley, the cap, *B*, is removed and the threaded nipple, *A*, is screwed into the oil hole. The cap, *B*, is filled through the feed pipe, *C*. The air escapes through the small vent hole, *b*, at the bottom. The cup is then placed in position on the nipple with the feed pipe seated therein. The cup is next slightly rotated to engage the spring, *a*, in the socket, thereby locking the cup in place. When the pulley is operated, the lubricant is carried to the top of the cup by centrifugal force, filling the tube, *C*, which is open at the top and serves as a measuring tube for the charge of oil to be delivered to the bearing and from which the rotation of the shaft draws a small quantity to the bearing. When the pulley starts or stops, the first or last two or three slow rotations fill the tube with oil and discharge part of the contents to the bearing and as a result, sufficient oil is always delivered to thoroughly lubricate. The cup can be removed, filled and replaced with the pulley in any position, thus obviating the necessity of shifting belts, turning shafting, etc. In Fig. 2, the cup is shown detached from the nipple for filling. The cup is made of thin pressed steel and is so light that counterbalancing is not necessary. This oil cup is manufactured by the American Specialty Co., Chicago.

A Combination Grinder

A motor-driven, combination twist drill and dry grinder, built by the Bridgeport Safety Emery Wheel Co., Bridgeport, Conn., is shown in the accompanying illustration. This machine has been designed for shops in which it is desired to make one machine do double duty. The spindle, at one end, is equipped with a plain grinder for miscellaneous work, while a twist drill grinder is attached to the opposite side. The motor is fully enclosed. The base is of sufficient width to permit of bolting the bearings to the main body casting. The ring-oiling bronze bearings are renewable so that if the spindle becomes worn, it can be redressed and provided with new bronze bearings. By bolting the bearings on the main base a very

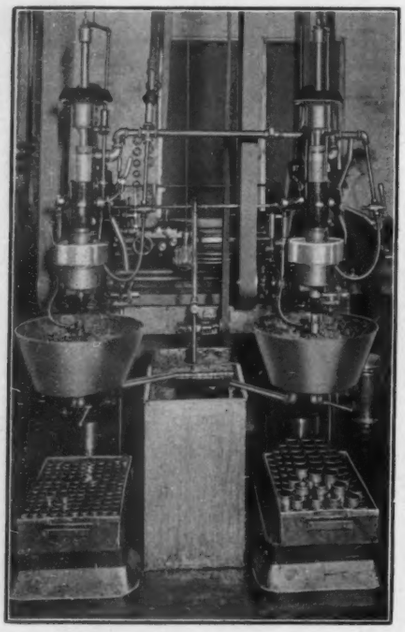


COMBINATION, MOTOR-DRIVEN TWIST DRILL AND DRY GRINDER

rigid construction is obtained. The height of the machine from the floor to the center of the spindle is 40 inches; the length of the ring-oiler bearings, 8 inches; diameter of the spindle in the bearings, 1⅜ inches; diameter of the spindle between flanges, 1⅜ inches; the distance between wheels, 33½ inches; the length of the spindle, 43¼ inches and the weight of the machine is 650 pounds.

All-Geared Tapping Machines

Two 20-inch, all-geared tapping machines, built by the Barnes Drill Co., Rockford, Ill., and used for tapping pressed steel grease cups by the inverted process, are shown in the accompanying illustration. The ma-



TWO ALL-GEARED TAPPING MACHINES USED FOR TAPPING PRESSED STEEL GREASE CUPS BY THE INVERTED PROCESS

chines are fitted with special spindles equipped with Garvin air cylinders and chucks and special cup type tables. The air chucks automatically grip and release the cups without stopping the spindle, and the work is thus revolved down on the tap, which is held in a Colburn floating tap holder in the cup type table and the oil is supplied from the center of the tap, as shown on the machine at the left. The chips are thus forced out by oil and gravity and in this way accurate results are obtained in tapping blind holes. The spindle of this drill is counterbalanced and the nose is extended to bring the drift hole below the sleeve. Transmission gears are located on the diagonal shafts, and four changes of speed are provided without back gears, any one of which is easily obtained without stopping the drill and by merely operating the proper shifting lever. The back gears are operated by a small lever accessible from the front of the drill, and by means of these gears, eight changes of speed can be obtained for all twist drills from ⅛ inch upward. There are twenty changes of positive feeds from 0.001 up to 0.025 inch. The height of the drill is 70 inches and the distance from column to center of table, 10¼ inches. The diameter of the column is 16 inches, diameter of spindle, 1-7/16 inches, vertical travel of spindle, 10 inches and the vertical travel of the table, 16 inches.

Combined Tachometer and Cutmeter

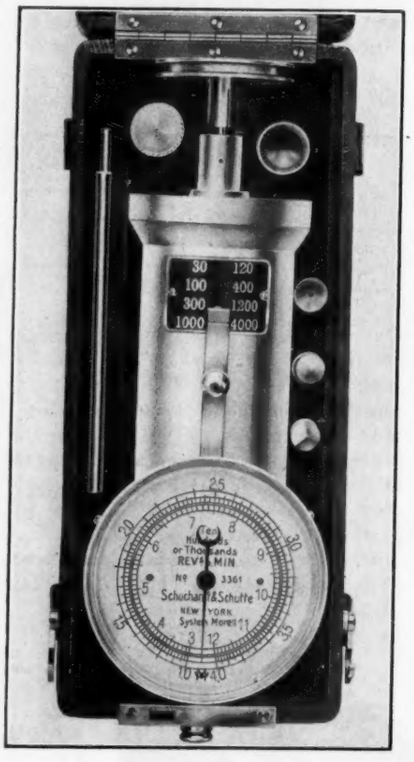
A new hand tachometer adapted for a wide variety of uses, manufactured by Schuchardt & Schuette, 90 West Street, New York City, is shown in the accompanying illustration. This instrument is a combined hand tachometer and cutmeter and it is equally useful for indicating rotative as well as progressive speeds. It will measure the revolutions of steam engines, gas engines, motors, dynamos, etc., as well as the cutting speeds of milling machines, engine lathes, planers, drilling machines, etc. With the aid of this instrument, belt slipping is quickly detected. Four different speed ranges are provided, those in the instrument most commonly used being from 30 to 120 revolutions per minute to 1,000 to 4,000 revolutions per minute. A tachometer of this type, of maximum measuring capacity, shows speed ranges from 100 to 400 revolutions to 3,000 to 12,000 revolutions per minute. There is only one spindle for all ranges of speed and adjustment is made by shifting a thumb slide while the object under test is running. The tachometer is constructed on the principle of the circular pendulum. The housing is made of an aluminum alloy which reduces the weight to a minimum.

The Loy & Nawrath Co., Newark, N. J., advises that it is making additions to its plant which, including the machine tool equipment, will entail an expenditure of about $20,000. The necessary tools have already been purchased.

Book Review

Foundry Irons, by Edward Kirk; 6 x 9 inches, 276 pages, illustrated; published by Henry Carey Baird & Co. and furnished by THE IRON TRADE REVIEW for $3, postpaid.

This work has been prepared to meet an insistent demand for practical information of foundry irons and their manipulation in the production of the various classes of castings. The author presents in a condensed form, only such matter as is of practical value to the founder and has eliminated, as far as possible, theories that have not been established as principles and all laboratory experimental work that has not been fully demonstrated to be useful in actual foundry practice.



NEW HAND TACHOMETER

The work contains useful data on the manipulation of foundry irons as actually practiced in foundries by both the old and the new methods. In this way is placed before the founder, foundry foreman, molder and melter such a variety of methods that he cannot fail to obtain good results under any and all of the various conditions met with in the manipulation of these irons. Semi-steel is extensively treated from knowledge gained by the author in producing this metal and from information obtained from practical foundrymen engaged in this practice.

The history and sources of iron, its manufacture, as well as the fuel used in smelting, is briefly discussed and coke

for foundry use is comprehensively treated and includes both the by-product and beehive varieties. A chapter on the loss and gain of iron in melting is interesting, as it contains the loss percentages of various grades of scrap melted in the cupola. Foundry chemistry and elements and metalloids are also discussed from the foundryman's standpoint. The fracture grading of pig and scrap irons will prove helpful to the foundryman, particularly the latter, although pig iron today is rarely, if ever, judged by fracture in this country. The chapter on mixing irons will prove exceedingly valuable, as it contains formulas for practically all classes of castings. Other subjects discussed include casting by direct process, grading iron by analysis, chemical standards for iron castings, testing cast and malleable iron, including the making of mixtures and methods of annealing. Twenty pages are devoted to foundry notes and contain practical hints on annealing,

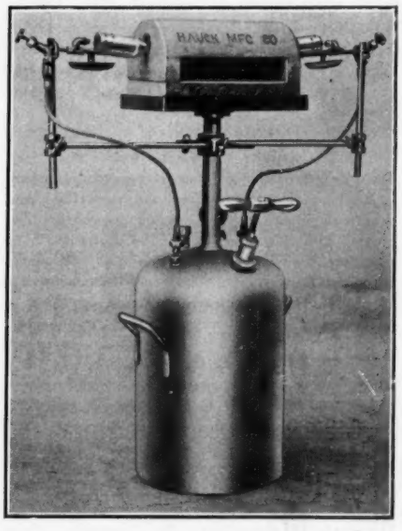


FIG. 1—HAUCK FORGE ARRANGED FOR TOOL DRESSING, TEMPERING AND FORGING

pickling, and tinning cast iron, as well as a discussion of the defects of cast iron and suggestions for overcoming these difficulties.

The work is essentially practical and will prove a handy text book for foundrymen engaged in the manufacture of gray iron or malleable castings.

The General Drop Forge Co., 1739-56 Elmwood avenue, Buffalo, advises that it has nearly completed a new blower house, a one-story steel structure designed to provide better blower facilities for the furnaces and for blowing scale from dies. All contracts in connection with the new building have been let.

A Portable, Combination Forge

Portable forges and burners for machine and repair shops, using oil as fuel, are now being extensively installed and in the accompanying illustrations are shown several combinations of the portable forge, built by the Hauck Mfg. Co., Brooklyn, N. Y. Kerosene is used as fuel and this forge is adapted for brazing, annealing, tempering, forging, preheating, melting soft metals, heating soldering irons, etc. All heating operations can be performed in rapid succession by merely changing the refractory tiles on top of the forge. There are at least six different heating operations carried on in every repair shop, including brazing and tempering, tool making and dressing, annealing, melting soft metals, soldering, preheating and expanding. In many large establishments, a separate furnace for each of these heating operations is generally used. This portable forge has been designed to perform all of these different operations with one piece of equipment. In addition, this forge can be changed to an oil furnace for the various classes of work requiring heat treatment. The forge or brazing table consists of a 12-gallon seamless steel tank, inside of which is placed a hand pump. Two powerful burners, connected with hose, are mounted on brackets, so that the position of the burners can be quickly changed. A table, extending from the top of the tank, is lined with refractory tiles. In Fig. 1, this forge is arranged for tool dressing, tempering or blacksmithing, and in Fig. 2, it is arranged for use as an annealing furnace.

New Iron Range?

It is believed by officials of the Indian office and of the geological survey that a considerable area of iron ore lands will be added to the large mining district of northern Minnesota.

Last October, while agents of the government were making examination of Indian lands on the White Earth reservation, which lies 250 miles southwesterly from the Vermillion range, 200 miles southwest of the Mesaba range and 100 miles to the northwest of the Cayuna range, they discovered traces of brown and red hematite, but no official report was made.

Specimens were sent to Duluth for assay, and although only surface specimens, they gave excellent indications of the existence of high-grade soft and hard ore, apparently in that vicinity, and the experts at Duluth have taken a lively interest in that part of the country.

Recently, Secretary Fisher, of the interior department, has issued an order directing the geological survey to make systematic examination of the soil and rock on the reservation, and has also directed that all patents about to be issued to the Indian owners of the allotted lands be held up pending this investigation.

The writer has for several years been familiar with the surface formation of the White Earth lands, and has examined numerous specimens of rock and gravel found in certain portion of the reservation. The oxidization and resultant decomposition of these specimens showed their purely superficial origin, and nowhere has there become apparent the mother vein, ledge or lode from which they probably had their birth. Neither is there the slate, jasper or quartz that so frequently serves as a wall for iron veins in deposits in the old ranges. This would indicate that the ore body dips to a considerable depth,

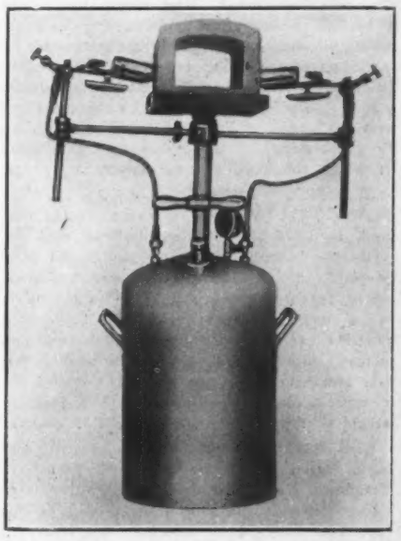


FIG. 2—HAUCK FORGE ARRANGED FOR PREHEATING AND ANNEALING

or that the specimens are but "floats," deposited by glacial action in the valleys where found.

The recent order alluded to affords a hint of some discovery more important than those above described.

The Universal Machine Co., Toledo, O., announces an increase in capital stock from $25,000 to $100,000 in order to provide for the consolidation of that company with the Standard Machinery Co., Bowling Green, O. New buildings of brick and concrete, containing 20,000 to 25,000 square feet of floor space, are to be erected at Bowling Green, O. The equipment for the new buildings has already been contracted for. The Universal Machine Co. will continue to manufacture the same products as heretofore, including standard bolt cutters.

New Catalogs

PLATINUM WARE.—J. Bishop & Co., Philadelphia, refiners of platinum, gold and silver, illustrate and describe platinum ware for laboratory use, in a 48-page catalog. Tables of weights of platinum ware, sheet and foil, are also included.

THE PULSOMETER.—An attractive handbook, recently issued by the Pulsometer Steam Pump Co., 17 Battery place, New York City, entitled, "The Pulsometer," is fully illustrated and shows the pulsometer employed for different kinds of work. The operation and construction of this device is explained and tables are included on pipe sizes, loss of head due to friction in pipes, as well as other data on the flow and pumping of water.

ELECTRIC PYOMETERS.—In a 16-page catalog, issued by the Wilson-Maeulen Co., New York City, its line of electric pyrometers is illustrated and described. This concern is also sending to the trade a hanger which contains a table for the conversion of Centigrade to Fahrenheit and vice versa, as well as melting points of the elements. This hanger will prove of value in the melting departments of foundries and steel works.

EVAPORATORS. — The Griscom-Spencer Co., 90 West street, New York, has issued a booklet describing and illustrating its Reilly multi-coil evaporator. This apparatus is intended for producing pure water by distillation from sea or other water; for separating a volatile liquid from a mixture of heavier liquids, or for concentrating solutions by evaporating off the water or other liquid in which the residues are dissolved.

ELECTRIC LIGHTING AND POWER PLANT.—The Wood & Spencer Co., Cleveland, in a 16-page booklet, illustrate and describe the "Casalux" electric lighting and power plant, intended for use in small buildings, stores, country homes, etc. The plant consists of a gasoline engine with direct-connected electric generator, controlling switchboard and storage battery. Both the engine and generator are mounted on one base. The engine has a capacity of 1½-horsepower. The shipping weight of the entire plant is only 1,200 pounds.

CENTRIFUGAL PUMPS.—A recent bulletin, issued by Henry R. Worthington, 115 Broadway, New York City, is devoted to centrifugal pumps for low-head service. This type was designed to meet the large demand for a reliable pump which may be purchased at a low price, and is especially suitable for pumping out excavations, coffer-dams and for small irrigation plants. A table is included, showing several combinations of engine-driven pumps, and many other combinations can be made to suit special conditions. Another bulletin illustrates and describes house and sump pumps.

POLYPHASE INDUCTION MOTORS.—In bulletin No. 1081, issued by the Allis-Chalmers Co., Milwaukee, the extensive line of polyphase induction motors, built by this concern, is illustrated and described. Two types of motors are shown. Potential starters are provided for reducing the voltage applied to the stator windings during the starting period. The starter consists of potential transformers for reducing the voltage and a controller for making the necessary changes in connection. The transformer has several taps for adjusting the starting voltage to suit the conditions under which the motor is operating.

TRANSFORMERS. — The Crocker-Wheeler Co., Ampere, N. J., has issued a folder describing its line of transformers. In the Remek transformer, made by this company, the laminations for both the yoke and the core are punched simultaneously by a compound die. It is claimed that this arrangement insures a perfect fit, thus doing away with lap joints at the edges of contact of the corresponding laminations. Hence, there are no current losses from eddy currents set up in lap joints, and no vibration of the laminations, due to lap joints, is possible. It is also claimed that 85 per cent of the magnetic path of this transformer is in the direction of the fibre of the metal.

SHEETS, PLATES AND STAMPED WARE.—In a 192-page catalog, 6 x 9 inches, is described the line of black and galvanized sheets, tin and terne plates, conductor pipe and miscellaneous roofing supplies, metal lath, metal ceilings, black and galvanized wares, and other products manufactured by the Wheeling Corrugating Co., at its rolling mills and works at Martins Ferry, O., and Wheeling, W. Va. The catalog is well illustrated and contains a number of valuable tables which include data on standard gage sheets and plates. Detailed instructions for making measurements on roofs and other surfaces are included. The catalog is printed on thin paper, thus avoiding any appearance of bulkiness.

PRECISION TOOLS.—An unusually complete and handsomely illustrated catalog has just been issued by the Rivett Lathe Mfg. Co., of Brighton, Boston. This book describes, in detail, the various lines of machinery built by this concern and includes a revised price list. Rivett machinery was first manufactured in 1884, when Edward Rivett designed a bench lathe. Following a number of improvements and additions to this line, the Rivett company now manufactures the following tools: Internal and external grinders; bench millers; swivel bench millers with back-geared head; bench lathes; manufacturers' lathes and precision lathes. Particular attention is directed to the precision grinder, which is operated at exceedingly high speeds.

METALLOGRAPHIC LABORATORY SUPPLIES.—Sauveur & Boyleston, Cambridge, Mass., have issued a catalog describing and illustrating their line of apparatus for research in metallography. The outfit recommended as including all the essential parts required by the metal microscopist, is as follows: One metallurgical stand with two eyepieces and three objectives; one vertical illuminator; two-stage specimen holders; one auxiliary tube and one copy of "Manipulation of the Microscope," by Edward Bausch. In addition to the above outfit, complete descriptions, copiously illustrated, deal with a number of special instruments for the laboratory. In view of the increasing recognition of metallography as a practical means for determining the physical characteristics of the various metals, the catalog is of unusual interest.

TROPENAS CONVERTERS.—An exceedingly valuable 52-page pamphlet, which describes the Tropenas process of steel manufacture in detail, has been issued by the Tropenas Converter Co., 50 Church street, New York City. The manufacture of steel castings is discussed at length and attention is directed to the advantages of the converter process. A large number of illustrations are included, showing installations in all sections of the United States and numerous illustrations of converter steel castings are also shown. The drop bottom converter, a recent development, is also described, as well as such steel foundry equipment as sand grinders and mixers, ladle heaters, etc. The catalog also contains a large number of testimonial letters from concerns manufacturing steel by the Tropenas converter process.

ELECTRIC MINE PUMPS.—The Aldrich Pump Department, Allentown, Pa., has issued a bulletin describing the Aldrich, vertical, quintuplex, electric mine pump manufactured by the Allentown Rolling Mills. This pump is recommended for permanent service at a mine station where the water is to be pumped against a heavy pressure. The crankshaft, connecting rods, gearing, housings and other vital parts of the pump are made with a large factor of safety so that the normal load requires only a part of the strength of the machine. The pump is designed to operate normally at a low speed, but may be run at high speed with safety. It is claimed that the pump will successfully pump gritty or acid water. The plunger can be oiled while the pump is in motion and a machine of large capacity can be dismantled and lowered down a small mine shaft.

CRANES.—Wrecking, locomotive, construction, pillar and hand power cranes, as well as pile drivers, transfer tables, portable rail sawing machines and clam shell buckets, are illustrated and described in a handsome, 80-page catalog, issued by the Industrial Works, Bay City, Mich. The line of cranes built by this concern is designed to meet all needs and requirements from large wrecking or construction cranes of a lifting capacity of 120 tons, on through a long line of hoisting apparatus to the hand power cranes of one ton maximum capacity. These numerous types of lifting machines cover the entire field of portable steam, electric and hand power station cranes. These include locomotive cranes, propelled by their own power, as well as stationary cranes of every size and description. The illustrations are particularly interesting in that they show wrecking cranes at work, as well as the application of lifting devices for various uses.

STEEL SASH.—Lupton's steel sash and Pond continuous sash, and operating device, as well as other specialties, are illustrated and described in a 36-page catalog, issued by the David Lupton's Sons Co., Philadelphia. The specialties made by this concern include a complete line of steel sash, skylights and operating devices that entirely cover the field of natural lighting and ventilation. The counterbalanced type of steel sash manufactured by this concern, is designed for foundries, forge shops and factories requiring a large amount of ventilation. The large lights of glass are easily cleaned and the sash, when open, does not project beyond the wall line. In addition to the details of constructive and standard forms of steel sash, views are given of a large number of interesting installations in large plants throughout the country. These include not only power houses, foundries, etc., but industrial plants of a widely diversified character.

SOOT CLEANER.—A device for removing soot from water tube and return tubular boilers, is illustrated and described in a 32-page catalog, issued by the Vulcan Soot Cleaner Co. of Pittsburg, through its sales department, G. L. Simonds & Co., 801 Steinway building, Chicago. The economies effected by the removal of soot from boilers, it is claimed will reduce the fuel expense from 5 to 25 per cent. The device consists of a stationary system of piping operated by valves from the outside of the boiler setting. Vertical branch lines extend from a 2-inch horizontal blow line and to these branch lines are connected long, perforated pipes that extend the entire width of the boiler. At certain points, however, where the heat is greatest and where the soot is the least, special two-way and three-way nozzles, placed flush with the fire brick setting, take the place of the long, perforated pipes. This soot cleaner is adapted for all types and combinations of baffles as applied to water tube boilers. A list of installations in industrial plants of all kinds, is also included.

IRON AND STEEL SECURITIES

Prices on the New York exchange moved in a narrow range last week and trading was dull, due to the absence of important influences.

Monday stocks were dull but firm, prices averaging higher; July wheat advanced on reports of a damaged crop while cotton declined violently on favorable weather reports; sterling exchange was weak. Tuesday was the most exciting day of the year in the grain markets, prices advancing sharply on unfavorable weather returns. American Telephone broke four points on the announcement of a new issue of $50,000,000 stock; the government announced the Panama canal bond award, the bulk of the $50,000,000 selling at prices ranging from 102.21 to 103. Prices averaged slightly lower on a dull market, Wednesday; the grain markets were active and excited, corn and oats advancing to highest prices of movement. On Thursday the stock market was active, weak and lower, decision in the Dupont powder case and general trend of legislation causing a reaction; London exchange closed for the remainder of the week. On Friday market rallied on light business and closed at best prices of day; grain markets were lower. The decision in favor of the Union Pacific, on Saturday, caused a strong and active stock market while the grain markets were lower.

Call money ranged from 2½ to 2 per cent. Time money was moderately active in the early days of the week but later became dull. One additional trust company was admitted to the New York clearing house association. The statement of the actual condition of clearing house banks showed loans increased $31,589,000; net deposits increased $31,549,000; reserve increased $18,148,000; surplus reserve increased $10,260,750, the total surplus standing at $84,564,000, and the percentage of reserve 28.5, compared with 29 the week previous. Non-member banks and trust companies showed loans increased $736,600; net deposits increased $502,500; reserve on deposits increased $721,900, and the percentage of reserve 29.3, compared with 29.1 the week previous. Commercial failures for the week were 215, as against 221 the preceding week, and 219 the corresponding week last year. Bank clearings for the week were 4 per cent below the preceding week and 7.7 per cent over last year. Shares were sold to the number of 1,767,645, compared with 2,474,639 the preceding week and 2,280,350 the corresponding week last year. Bonds, exclusive of government bonds, were sold to the amount of $13,369,000, compared with $15,001,000 the preceding week and $8,570,000 the corresponding week last year.

	Closing Quo. June 24	Changes in week	Annual Meeting date 1911.		Stock Outstanding	Basis	Dividend Last Dividend	Dividend Date Last Div. Pay.
Allis-Chalmers	9	.....			$19,820,000		.....	.....
Allis-Chalmers, pr.	29½	—1½	Nov.	2	16,150,000	7 cum.	1¾ Q.	Feb., 1904
American Can	10⅞	— ⅛	Feb.	1	41,233,300		1¾ Q.	.....
American Can, pr.	85⅝	.....			41,233,300	7 cum.	1¾ Q.	July, 1911
Am. Car & Fdy.	56¾	— ¼	June	29	30,000,000		½ Q.	July, 1911
Am. Car & Fdy., pr.	116½	.....			30,000,000	n. c.	1¾ Q.	July, 1911
American Loc.	41¼	—1	Oct.	17	25,000,000	5	1¼ Q.	Aug., 1908
American Loc., pr.	110	.....			25,000,000	7 cum.	1¾ Q.	July, 1911
American Ship	70½	.....	Oct.	11	7,600,000	4	2 Q. **	June, 1911
American Ship, pr.	111	.....			7,900,000	7 cum.	1¾ Q.	July, 1911
Am. Steel Foundries	41¼	—1¼	Dec.	7	17,184,000		1 Q.	May, 1911
Barney & Smith	20	.....	June	6	2,000,000	4	1 Q.	Dec., 1907
Barney & Smith, pr.	87	.....			2,500,000	8 cum.	2 Q.	Mar., 1911
Bethlehem Steel	33⅝	— ⅛	April	4	14,862,000		.....	.....
Bethlehem Steel, pr.	63½	— ¼			14,908,000	7 n. c.	¾ Q.	Feb., 1907
Cambria Steel	45	— ⅛	Mar.	21	45,000,000	5	1¼ Q.	May, 1911
Cambria Iron	44	.....			8,468,000*	4	2 S. A.	Apr., 1911
Chicago Pneumatic Tool	51½	.....	Feb.	20	6,485,800	4	1 Q.	July, 1911
Colorado Fuel	35	+ ⅛	Oct.	16	34,235,500		1¾ Q.	Apr., 1902
Crucible Steel	13½	+ ⅛	Oct.	18	24,578,400		3½.	.....
Crucible Steel, pr.	82¼	—1			24,463,500	7 cum.	1¾ Q.	June, 1911
Empire Steel	5	.....	Feb.	22	1,254,770		.....	.....
Empire Steel, pr.	50	.....			2,500,000	6 cum.	1 S. A.	July, 1911
Fay & Egan	70	.....	Feb.	21	1,000,000	6 cum.	3 S. A.	Feb., 1911
Fay & Egan, pr.	110	.....			1,000,000	7 cum.	1¾ Q.	Feb., 1911
General Electric	164½	+2¼	May	9	65,179,600	8	2 Q.	July, 1911
Harbison-Walker	45	.....	Jan.	16	18,000,000		½ Q.	June, 1911
Harbison-Walker, pr.	98	—3			9,600,000	6 cum.	1½ Q.	Apr., 1911
International Pump	41¾	— ⅝	Dec.	12	17,762,500		1 Q.	Nov., 1910
International Pump, pr.	89⅞	— ⅝			11,350,000	6 cum.	1½ Q.	May, 1911
Lackawanna Steel	42	.....	Mar.	8	34,978,000		.....	.....
Lake Sup. Corp.	27	— ½	Oct.	4	40,000,000		.....	.....
New York Air Brake	75⅛	+4	Mar.	8	10,000,000	6	1½ Q.	July, 1911
Niles-Bement-Pond	94	.....	Feb.	8	8,500,000	6	1½ Q.	June, 1911
Niles-Bement-Pond, pr.	104	.....			2,000,000	6 cum.	1½ Q.	May, 1911
Otis Elevator Co.	72½	.....	Mar.	20	6,375,000	1	1 Q	July, 1911
Otis Elevator Co., pr.	102	.....			6,310,000	6 n. c.	1½ Q.	July, 1911
Pa. Steel	60	.....	May	8	10,750,000		.....	.....
Pa. Steel, pr.	106½	.....			16,500,000	7 n. c.	3½ S. A.	May, 1911
Pittsburg Coal Co.	21	— ¾	Feb.	10	28,104,600		.....	.....
Pittsburg Coal Co., pr.	86½	— ¼			27,071,800	7 cum.	1¾ Q.	Apr., 1911
Pressed Steel Car	37	.....	Feb.	15	12,500,000		1 Q.	Aug., 1904
Pressed Steel Car, pr.	101¾	—1			12,500,000	7 n. c.	1¾ Q.	May, 1911
Pullman	162	— ¼	Nov.	8	120,000,000	8	2 Q.	May, 1911
Railway Stl. Spring	38¼	+1¼	Mar.	2	13,500,000	2	1 S. A.	Oct., 1908
Railway Stl. Spring, pr.	102	—1			13,500,000	7 cum.	1¾ Q.	June, 1911
Rep. Iron & Steel	30¼	.....	Oct.	18	27,191,000		.....	.....
Rep. Iron & Steel, pr.	93⅜	— ⅛			25,000,000	7 cum.	1¾ Q.	July, 1911
Sloss-Sheffield	50	—2	Mar.	15	10,000,000	5	1¼ Q.	Sept., 1910
Sloss-Sheffield, pr.	112	.....			6,700,000	7 n. c.	1¾ Q.	July, 1911
U. S. Pipe & Fdy. Co.	18	.....	June	28	12,106,300	7 n. c.	1 Q.	Dec., 1910
U. S. Pipe & Fdy. Co., pr.	59⅜	.....			12,106,300	2	1¼ Q.	June, 1911
U. S. Steel	79½	+ ⅜	April	17	508,302,500	5	1¼ Q.	June, 1911
U. S. Steel, pr.	118⅝	.....			360,281,100	7 cum.	1¾ Q.	May, 1911
U. S. Steel, 5s.	105¾	+ ¼			463,798,000	5	.....	.....
Va. Iron, Coal & Coke	71½	+ ¾	Sept.	19	9,073,680		5. †	Oct., 1907
Westinghouse Electric	76⅞	+1⅜	July	26	3,998,700*		1¾ Q.	July, 1911
Westinghouse Air Brake	150	+1	Oct.	3	13,750,000*		5 Q. ‡	July, 1911

Par value of shares, $100, except those starred (*), $50.
**Includes last 1 per cent payment of 4 per cent extra.
†Stock.
‡Includes 2½ regular, 1½ extra and 1 special.

Copper Stocks.

New York.—Amalgamated Copper closed 71¼, a net gain of 3⅛.

Boston.—Butte Coalition closed 19, a net loss of ⅜; Calumet & Arizona closed 61, a net loss of 1; Calumet & Hecla closed 475, no change; North Butte Mining closed 34⅜, a net loss of 1⅛; Quincy Mining closed 73, a gain of 1½.

Financial Notes.

The American Ship Building Co. has declared the regular quarterly dividend of 1¾ per cent on its preferred stock, payable July 15.

THE IRON TRADE REVIEW

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THE AVERAGE PAID CIRCULATION OF THE IRON TRADE REVIEW FOR THE ISSUES OF THE FOLLOWING MONTHS WAS:

April, 1910	5,793
May	5,827
June	5,842
July	5,864
August	5,875
September	5,895
October	5,955
November	5,993
December	6,026
January, 1911	6,058
February	6,072
March	6,091
April	6,108
May	6,112

June 29, 1911

Steel and Iron Bar Competition

The appearance of an issue between the iron mills of the central west and the Amalgamated Association over the wage scale for the year beginning July 1 is an outgrowth of the relative conditions in the branches of the iron and steel industry rather than a sign that the industry as a whole is tending toward lower wages. At the first conference, June 7-8, the men demanded the existing scale and the Western Bar Iron Association a general reduction of 10 per cent. The adjournment to July 6, a date after the expiration of the present scale, raises a direct issue.

There are occasional suggestions that wage reductions may be forced in the steel industry. This may be, but the issue upon the iron mill scale does not prove it. That issue is due directly to the competition between iron bars and steel bars. The iron bar market has steadily declined until it has reached a basis of practically no profit. With a high price for steel bars, the iron mills may have had hope that with low enough prices for iron bars they could get enough business to run full, through some consumers adopting iron bars in place of steel bars. That, however, did not result when iron bars dropped to 1.20c, Chicago, with steel bars at 1.40c, Pittsburg, or 1.58c, Chicago. The iron mills ran better than the steel mills, but not a great deal better.

With steel bars reduced to 1.25c, Pittsburg, the iron bar market is under still greater pressure, and the iron mills naturally fall back upon the wage rate as a source of opportunity for further competition.

During 1910, the average price of iron bars, Chicago, was about 1.45c, and at valley and Cleveland mills about the same, while the average of the Pittsburg basis on steel bars was between 1.40c and 1.45c. If this relation had been maintained, through the same co-operation among iron mills as existed with the steel mills, steel bars would probably not be as low as they are to-day, and in any event iron bar prices would be higher. The iron mills would not then regard a wage reduction as necessary as they do.

That co-operation could have been practiced among the iron mills, however, is quite improbable. The conditions are altogether different. The iron mill is a local proposition. Each district of any importance makes its own market. There is no "Pittsburg basis," which is the mainstay of the co-operative movement in steel prices. The iron mills use scrap very largely, and scrap is a local proposition. Means are generally found to use it not far from where it originates.

It is interesting to observe that the basic open hearth steel furnace has shown a tendency to drive out the iron mill. In districts in which much open hearth steel is made, iron mills have not lately been thriving as they have in districts in which little open hearth steel is made. Of course there is much material which can only be used by one or the other of the processes, but there is a considerable tonnage which can be used in either. The remelting proposition is tending slowly to drive out the welding and rolling process, and the men in the latter industry cannot expect to get the wages they did in the good old days when the puddlers and iron rollers almost controlled the industry.

Alaska's Appeal for Justice

Maurice D. Leehey, an attorney of Seattle, writes stating that he has read the editorial published in THE IRON TRADE REVIEW of May 4, 1911, concerning the criminal charges made against certain members of the firm of M. A. Hanna & Co. Mr. Leehey then says in part:

I write to call your attention to the fact that it is just this sort of treatment which the government has for several years been according the men who discovered the Alaska coal fields, and who have been endeavoring to pursue their development. I agree with everything you say concerning the charges against Messrs. Hanna, but they are well prepared to defend themselves. On the other hand, poor men of the honest, rugged, sturdy type, who conquered the west, the same class of men who opened the coal fields and iron mines of Pennsylvania and Ohio, who converted the wilderness of the Mississippi valley into a blooming garden, who have conquered the plains and tunneled the mountains, and made the great northwest yield up its treasures of mine and field, this same type of men have gone into Alaska, have endured the hardships and privations of the northland in an effort to open up that country. They discovered the coal fields. They proceeded according to the only laws available. They interested some men in the states to advance sufficient money to conduct development work, and had they been accorded any measure of fair treatment, such as the courts would have compelled any corporation to accord them, Alaska would now be using her own coal instead of importing an inferior article from Canada, the Pacific coast would be prosperous, and its prosperity reflected throughout the length and breadth of our land.

Now, practically the only charge against these Alaska coal claimants is that of conspiracy. The law allows each to take only 160 acres of land.

It was natural that persons entering the field should join in their efforts. It was only natural too, that they should try to obtain money from people "back home," and obtain powers of attorney in that way to locate coal lands. It has not been shown in a single case of the 1,100 entries where there was any real conspiracy to defraud the government, or even where the parties had absolutely agreed that they would unite their holdings after obtaining patent. Naturally enough they operated in groups, employing the same agent, perhaps, doing their development work in a few places instead of scattered over each claim, because in that manner they could better prospect the ground and provide a system of development. These groups united in employing the same surveyor. In some cases it is true that one or two of the interested parties conducted negotiations with a view to selling the holdings of all the entrymen in that particular group, but the coal law of Alaska expressly permits the assignment of such claims. That is the entire evidence which the government has to prove its charge of conspiracy.

We have no doubt that, owing to the agitation connected with the advocacy of conservation of natural resources, government officials have become timid in regard to clear-listing claims which ought to be so treated, and that injustice has been done. We do not, however, consider it within our province to investigate into the details of the merits of the controversy concerning Alaska coal lands. It certainly is unfortunate that there is a denial of justice for a time, but we have the greatest confidence in the sober second thought and mature judgment of the American people, and believe that at a not far distant date those who are honestly seeking to develop Alaska will have an opportunity to carry out their plans. The action of the land office this week in cancelling the Cunningham claims will probably hasten action of congress in passing the necessary legislation to insure the proper use of the lands of this territory by base or otherwise.

The development of Alaska has been checked, as the census of 1910 shows an increase during the 10 years of less than 2 per cent. The population is known to have increased from 1900 to 1906, and there has been a decrease during the past four years. This condition cannot continue permanently, and a land of the rich resources of Alaska cannot long be withheld from public settlement.

GET TOGETHER

Says Redfield, and Restore the American Flag to the Seas.

Hon. William C. Redfield, congressman from the fifth district, New York city, has recently returned from a trip to Japan. In a letter written during his trip, while he was in Bombay, to the American Blower Co., Detroit, of which he is vice president, he said that while he had seen two steamers carrying the flag of Sarawak and 20 that of Portugal, he had not, since leaving Japan, seen the American flag. Mr. Redfield writes at length of how humiliating it is from the standpoint of business and patriotism not to have the American flag on the high seas, and in conclusion he says:

"I do not write in advocacy of any special form or measure of relief, but only to do certain simple things, viz.: To bring the facts home to those most interested, and to suggest that it is high time the age of talk ended and the age of action began. Cannot we be patriotic and wise enough to drop this, that, or the other preference and agree on something that will give to our manufacturers and their workmen the share of the world's trade to which they are entitled? This would be a righteous and a reasonable protection."

Government Coke Figures

The report of the United States geological survey shows that more coke was produced in the United States in 1910 than ever before in the country's history and that the year was also a record breaker in the value of the product. In 1910 the output was 41,681,410 short tons, valued at $99,696,267, while that for 1909 was 39,315,065 short tons, valued at $89,965,483. Against this increase of $9,730,784 in value of product, there was an increase of $12,604,732 in the cost of the coal used.

The Ziegler-Schryer Mfg. Co., Freeport, Ill., manufacturer of gas, gasoline and distillate engines, advises that it is completing an addition to its machine shops, 80x180 feet. These shops are of reinforced concrete and are provided with Fenestra window sash. The addition will contain the superintendent's offices and a drafting room on the second story, while a crane bay, 27 feet wide, extends the full length of the building. Attention has been paid to provisions for the employes in the new building and it is furnished with lavatories, lockers, closets, etc. In addition to the machine shops, the plant now consists of a foundry, 60x200 feet, a wood working shop, a pattern room, testing room and a paint shop. The present officers of the company are: President, W. T. Rawleigh; vice president and general manger, P. F. Schryer; treasurer, F. L. Kobow; superintendent, E. A. Mensenkamp.

Lake Superior Mining Institute

The local committee of the Lake Superior Mining Institute on the Menominee Range has selected Tuesday, Wednesday and Thursday, Aug. 22, 23 and 24, as the dates for holding the sixteenth annual meeting of the Institute, and arrangements are now under way for the entertainment of the members. Further announcements will be issued in regard to the itinerary of the trip, the list of papers to be read and any excursion features, which may be decided upon. At the meeting held last year, a committee was appointed to prepare papers on "Mining Methods on the Menominee Range." This committee will present some very interesting papers. It is desired also to receive some papers on mining methods on the other ranges. "Efficiency," "Uniform Mining Laws" and "Safety Appliances," will also receive consideration.

New Mining Course.—Sibley college of Cornell University will add next fall a course in mining engineering to its curriculum. A committee, appointed by President Schurman, of Cornell, which is now preparing the details of the course, announces that most of the subjects requisite toward a good mining education are now taught at Cornell, and these, together with a number of proposed professional mining courses, will constitute the complete mining curriculum. The chairman of the committee in charge of the new branch is Prof. D. S. Kimball, of Sibley college.

Copper exports for the week ending June 22, were 6,788 tons, an increase of 2,208 tons; June 1 to June 22, 21,118 tons, an increase of 5,980 tons; Jan. 1 to June 22, 148,688 tons, an increase of 27,758 tons.

The city of Toronto will receive tenders up to July 3 for laying between 3,000 and 3,500 feet of riveted steel pipe, 6 feet in diameter, in Lake Ontario, for the waterworks department.

WAGE AGREEMENT

With Union Sheet and Tin Plate Workers Signed.

Representatives of the independent sheet and tin plate companies employing union labor and the wage scale committee of the Amalgamated Association of Iron, Steel and Tin Workers reached an agreement on the wage scale to become effective July 1, at a meeting held in Moorehead Hall, Pittsburg, June 23. Aside from a few minor changes in the foot notes, the wage agreement is practically the same as the one which became effective July 1, 1910, and which expires Friday midnight of this week. Twelve plants, consisting of 121 sheet and tin mills, out of a total of 15 plants, consisting of 149 sheet and tin mills, which operate under a union scale, have already signed the new agreement and the other three plants, containing 28 sheet and tin mills, are expected to sign the new scale within a few days. The following companies have agreed to the new scale: American Rolling Mill Co., Middletown, O.; Atlanta Tin Plate & Sheet Mill Co., Atlanta, Ind.; Carnahan Tin Plate & Sheet Co., Canton, O.; De Forest Sheet & Tin Plate Co., Niles, O.; Empire Iron & Steel Co., Niles, O.; Follansbee Bros. Co., Follansbee, W. Va.; W. H. Griffiths, Washington, Pa.; National Enameling & Stamping Co., Granite City, Ill., and St. Louis, Mo.; Newport Rolling Mill Co., Newport, Ky.; Pope Tin Plate Co., Steubenville, O.; Thomas Steel Co., Niles, O.; N. & G. Taylor Co., Cumberland, Md.; Whitaker-Glessner Co., Wheeling, W. Va., and Martins Ferry, O.; Youngstown Iron & Steel Roofing Co., Youngstown, O.; Zug Iron & Steel Co., Pittsburg, Pa.

One of the interesting features in connection with the signing of the new wage scale this year is that manufacturers did not insist upon a reduction in the base wage rates, notwithstanding that present prices of sheets are from $4 to $5 a ton below the market level a year ago when the 1910-11 wage scale was signed. This is taken as an indication that manufacturers are greatly encouraged with recent developments in the sheet trade and that an advance over present prices would not be unexpected.

At the annual wage scale conference in June, 1910, the wage scale committee of the Amalgamated Association asked for an advance in wages of 10 per cent. This proposition was rejected by the independent manufacturers, and later the Amalgamated leaders suggested a compromise of 5 per cent. This also was refused and, after a lengthy discussion, the 1909-10 scale was renewed.

Officially Reorganizing Baldwin Works

Public announcment is made of the completion of the official reorganization of the Baldwin Locomotive Works, Philadelphia. William L. Austin, the former president of the company, has been made chairman of the board of directors; Alba B. Johnson, vice president, succeeds Mr. Austin as president, and Samuel M. Vauclain, who has become general manager, becomes vice president. The board of 12 directors includes Mr. Austin, Mr. Johnson, Mr. Vauclain and Wm. Burnham, president of the Standard Steel Works Co., a subsidiary. The new capital is represented by Edward Stotesbury, Roland Z. Taylor and Thos. DeWitt Cuyler, of Philadelphia; E. C. Converse, Samuel M. Roberts, Charles D. Morton, Francis M. Weld and Otis H. Cutler of New York. Mr. Cutler is president of the American Brake Shoe & Foundry Co. It is announced that the holders of the $20,000,000 old stock received $14,100,000 in cash, $5,900,000 in preferred and $11,970,000 in common stock in the new company. The gross sales of the year 1910 of the Baldwin Locomotive Works alone were $29,057,999, and such gross sales have averaged $26,285,883 for the last ten years, 1901-1910. The gross sales for the year 1910 of the Standard Steel Works Co. were $6,241,845, and such gross sales have averaged $4,406,500 for the last ten years.

Welsh Tin Plate

Swansea harbor trust returns for the week ending June 10, with comparisons, follow:

	Week of June 10. Boxes.	Previous week. Boxes.	Corresponding week last year. Boxes.
Received	78,713	123,994	104,247
Shipped	100,536	145,858	122,326
Stocks	206,047	227,870	133,672

H. L. Schwarzenberg has been appointed the Cleveland representative for the Duplex Metals Co., of Chester, Pa., and will push the sales of that company's line of copper-clad steel nails, plate, wire and kindred products from the offices of the Foreign & Domestic Metals Co., 576-578 Rockefeller building, Cleveland.

INTERESTING SESSIONS

Of Society For Promotion of Engineering Education.

The annual meeting of the Society for the Promotion of Engineering Education opened Tuesday morning, June 27, in the assembly room of the Carnegie Technical Schools, Pittsburg. Prof. A. M. Talbot, of the University of Illinois, president of the association, presided. Prof. H. H. Norris, of Cornell University, is secretary of the society. Professional papers were read at the morning and afternoon session. The delegates were entertained at dinner at the Country Club, Pittsburg, Tuesday evening, by the faculty of the Carnegie Technical Schools, under the direction of Dr. A. A. Hammerschlag.

The annual election was held Wednesday morning. On Wednesday afternoon the delegates visited a number of industrial plants in the Pittsburg district. Wednesday evening an illustrated lecture was given on "The College Campus," by Professor J. M. White, of Purdue University, Lafayette, Ind.

Thursday's sessions were to be held in the University of Pittsburg buildings, and in the afternoon delegates will visit the plants of the Westinghouse companies, at East Pittsburg. Thursday evening, professors of various universities present will hold a reunion in the Carnegie Music Hall with members of the alumni of the different colleges they represent in Pittsburg. The committee in charge of arrangements for the annual convention consists of Prof. J. H. Leete, dean of the School of Applied Science, of the Carnegie Technical Schools, chairman; Prof. W. E. Mott, of the same school; Dean C. B. Connelly, of the School of Applied Industries, and Charles F. Scott, of the Westinghouse Electric & Mfg. Co.

The Asbestos Protected Metal Co. has announced the opening of its new plant for manufacturing asbestos covered metal and waterproof non-rusting skylights, at Beaver Falls, Pa. The company's executive offices will also be located at Beaver Falls hereafter.

The Westinghouse Air Brake Co. has declared the regular quarterly dividend of 2½ per cent, an extra dividend of 1½ per cent and a special dividend of 1 per cent, payable July 10. This is the same rate of declaration as three months ago.

J. & L. CHANGES

Among Sales Representatives—Pittsburg Sales District Established.

The Jones & Laughlin Steel Co. announces several changes among its sales representatives, effective July 1, and the establishment of a Pittsburg sales district. The latter will include the western Pennsylvania, eastern Ohio and West Virginia territory and will be in charge of A. C. Pollock, formerly identified with the sales department in the general offices, Pittsburg. F. A. Goodrich & Co. will retire as Detroit representatives of the Jones & Laughlin Steel Co. and Frederick H. Holt, formerly in charge of the office of F. A. Goodrich & Co., has been appointed district sales manager with offices in the Penobscot building, Detroit. It is also announced that the F. A. Goodrich Iron & Steel Co. will retire as the St. Louis representatives of the Jones & Laughlin Steel Co., and that E. D. Batchelor, heretofore connected with the sales department of the general offices, Pittsburg, has been appointed district manager of sales for the St. Louis territory with offices in the Pierce building. As a result of the above appointments, several minor changes will be made in the general offices, Pittsburg.

Russian Buyers Take Foreign Iron Actively

Private dispatches from abroad state that a considerable movement of Middlesbrough and Scotch irons is now going forward to Russia by reason of the reduction of the duty recently put into effect by the Russian government to stimulate imports and relieve the scarcity of iron caused by the insufficient domestic production. Considerable of the iron is going to the Black Sea district, which is the center of heaviest home production. An American special machinery interest is reported to have bought 3,000 tons of Scotch and Middlesbrough iron for shipment to its Russian plant.

Increases Its Business

The American Road Machine Co., Kennett Square, Pa., has increased its capital stock from $250,000 to $1,000,000, practically all of which has been paid in, in order to provide for the largely expanded manufacturing in which it is now engaged. The company supplies road officers and road building contractors with machine tools and appliances required in the building, maintaining and repairing of roads and streets. A few years ago the company's manufactured lines included road machines, small rock crushers for portable use and horse rollers. During the past few years, it has taken on the following additional lines: Steam road rollers, bottom dump wagons, large rock crushers with attachments, road oiling machines, elevating graders, bridges, corrugated metal pipe, cast iron pipe, light road machines.

Steel Casting Plant at Denver

The Western Steel Foundries Co. with a capital stock of $400,000 has just been incorporated at Denver, the incorporators being C. F. Springer, W. H. Kistler, E. M. Titcomb, G. C. Kimes and R. M. Cash. Mr. Springer, who promoted the company and with J. A. Troy will manage it, has offices at 1127 First National Bank building, Denver. The company has purchased the foundry and pattern shop of the Colorado Gray Iron Foundry Co. and will be ready for business about Oct. 1.

Increasing Capacity

The Savage Mountain Fire Brick Co., Frostburg, Md., has completed an addition which has increased its capacity 2,000 brick a day. It has under construction a new switch, a large shed and other minor improvements. The Savage Mountain works make the well known "Savage Mountain" roof brick, and have been owned by the Gorsuch family for over 47 years. The president of the company is Charles C. Gorsuch, and the treasurer and manager is John A. Caldwell.

The American Seeding Machine Co., Springfield, O., has declared a quarterly dividend of 1 per cent and an extra dividend of one-half of 1 per cent on common stock, and the regular quarterly dividend of 1½ per cent on preferred stock, both payable July 15.

Fire damaged the plant of the Forest City Electric Co., Cleveland, on June 16, starting from a defective oil tank. The loss on building and equipment is estimated at $12,000. The company manufactures electric railroad appliances and drop forgings.

H. J. Koontz, machinery and equipment dealer, Pittsburg, has removed his offices from the Farmers' Bank building, Pittsburg, to 1931 Carson street, where he has secured warerooms.

BIDS FOR COLLIERS

And Sea-Going Tugs Received by the Secretary of the Navy.

Proposals were received by the secretary of the navy, June 20, for constructing by contract four fleet colliers (Nos. 9, 10, 11 and 12) and two seagoing tugs, as follows:

Maryland Steel Co., Sparrows Point, Md., on Nos. 11 and 12; one collier at $984,000, 18 months; two colliers at $973,000, 24 months; without labor restrictions, and upon plans and specifications. Same, alternate bid, one collier $962,000, 18 months; two colliers, $951,000, each, 24 months.

Newport News Ship Building & Drydock Co., Newport News, Va., colliers Nos. 9 and 10; (8-hour restrictions), $995,000 each; colliers 11 and 12, $975,000 each, 22 months; colliers 9, 10, 11 and 12, $980,000 each, 24 months; colliers 11 and 12, (Babcock & Wilcox boilers) $997,000 each, 22 months.

Fore River Ship Building Co., Quincy, Mass., one tug, $212,000 or two tugs at $210,000 each, 9 and 10 months.

Maryland Steel Co, $209,600 each for two tugs, 11 and 12 months, or $210,300 each if payments are arranged differently.

New York Ship Building Co., Camden, N. J. $194,000 each; $195,000 each (heated forced draft); $205,000 each (B. & W. boilers); time, 12 months.

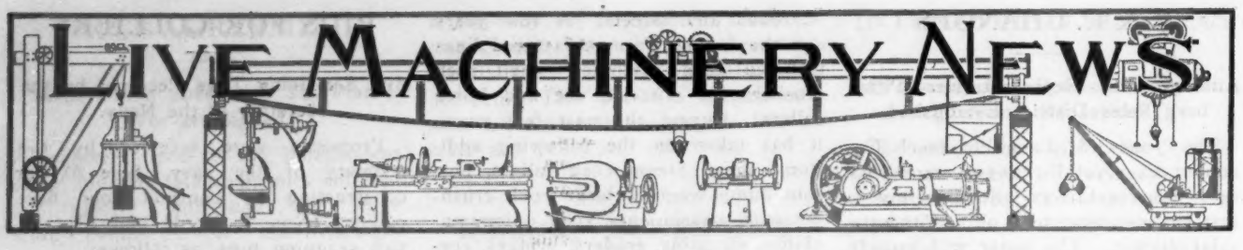
St. Louis Shipments

Receipts and shipments of pig lead and spelter at St. Louis for the last two weeks were as follows:

	Zinc and spelter.	Pigs of lead.
Receipts:—		
For week ending June 17.....	112,200	36,840
For week ending June 24.....	60,510	49,530
Shipments:—		
For week ending June 17.....	92,770	37,830
For week ending June 24.....	92,160	23,170

Made by Mesta.—The Mesta Machine Co. has shipped a two-stage air compressor with a capacity of 6,000 cubic feet of air per minute at 100 pounds pressure to the Four States Coal & Coke Co., at Worthington, W. Va., and has completed a four-stage compressor with a capacity of 2,400 cubic feet of air per minute for the same company.

Frederick K. Blanchard has been appointed agent for the Homestead Valve & Mfg. Co., Pittsburg, with headquarters at 422 River street, Troy, N. Y.



In New York it is expected that awards will soon be made on the list of machine tools for the proposed manual training school, to be erected at Newark, N. J. It is also expected that a healthy demand for contractors' equipment will result from the decision by the New York subway commission to push the work on the tri-borough extensions, the construction of which will involve over $100,000,000. In Pittsburg, the Pittsburg Crucible Steel Co. has sent out inquiries for a large number of cranes. That company is also taking bids on other equipment. The machinery business in general, in Pittsburg, shows fair improvement. In Cleveland, inquiries are being submitted on a large quantity of condensing equipment for power plants. A number of manufacturers are extending their plants and numerous small lots of machine tools are being disposed of. In Chicago, the International Harvester Co. has purchased a large amount of machinery for its Milwaukee works, while several other buyers have entered the market. It is expected that the Atchison, Topeka & Santa Fe will soon place orders on machinery previously inquired for.

Machine Tools

Machine tools will be installed in a shop which is being erected by the Decherd Mill Co., Decherd, Tenn. E. L. Harris is superintendent of the shop.

The Universal Stenotype Co., Owensboro, Ky., is in the market for a number of machine tools. The company is equipping a plant which it recently took over.

The contract for the machine shop and storage building, to be erected for the Plume & Atwood Mfg. Co., Waterbury, Conn., has been awarded to Chatfield & Chatfield, 94 Benedict street, Waterbury. The building will be 46 x 115 feet, three stories.

Foundries

The Newark Plaster Co., Newark, N. J., will erect a one-story brick foundry building, 80 x 105 feet, on Passaic avenue, that city.

The Wrought Iron Range Co., St. Louis, has purchased a site of 11 acres on which the company will erect a plant comprising five buildings, one of which will be 300 x 300 feet.

The Riter-Conley Mfg. Co., Pittsburg, will fabricate 974 tons of structural material for a new foundry, machine shop and blacksmith shop for the Fulton Iron Works, St. Louis.

The American Glyco Metal Co., operating a plant at Sixteenth and Rockwell streets, Chicago, for the manufacture of babbitt and bearing metals, will make some improvements to its babbitt foundry.

The Ames Plow Co. is erecting a new plant, including foundry, at South Framingham, Mass. The plant will be completed and operated during late fall after which the Worcester, Mass., plant of the company will be discontinued.

The Gurney Heater Mfg. Co., 188 to 200 Franklin street, Boston, is erecting a new plant at South Framingham, Mass., which will be used for manufacturing steam and hot water boilers and radiators. A large foundry is included in the plant.

Water Works

The Danberg Co., Gardnerville, Cal., will install an electric pumping plant.

Merrill, Ore., will install a municipal water system. E. E. Fitch is mayor.

Chino, Cal., has voted bonds to the sum of $40,000 for a municipal water system.

E. Lanfair, Vontrigger, Cal., will install a large pumping plant and irrigation system.

George Burnham & Co., San Diego, Cal., will lay mains and install a water plant in National City, Cal.

The Mason Light & Power Co., Mason, Mo., is planning to install new water works, which will require some electric pumps.

T. A. Elliott, 375 Ellis street, San Francisco, is taking bids for the construction of an extensive pumping system and storage tank system to be built by the Spring Valley Water Co., at San Francisco.

Railroads

The Pittsburg & Lake Erie Railroad Co. has awarded a contract to Anderson & Cook, Beaver, Pa., for the new box car repair shops to be built at Davis Island, Pa.

The Louisville & Nashville railroad is planning some minor improvements in the shops at Frankfort, Ky., which it took over from the Kentucky Highland railroad several months ago. W. H. Courtney is chief engineer.

Westinghouse, Church, Kerr & Co., New York City, have received a contract from the Illinois Central railroad for the construction of a 25-track round house and equipment at Champaign, Ill. The plant is to include a machine shop, coal chutes and other auxiliary equipment.

New Works

The Ball Engine Co., Erie, Pa., is building a one-story brick and steel storage house at Erie, to cost $12,000.

The Savage Tire Co. will erect a factory at Monrovia, Cal., for the manufacture of steel automobile tires.

The Hancock Mfg. Co., Charlotte, Mich., manufacturer of brass goods, advises that it is erecting a small addition to its present plant.

The Van Ormer-Lose Wrench Co., incorporated recently, is preparing plans for a new brick manufacturing plant to be erected at Trafford City, Pa.

Bids are being received by the General Electric Co. for a brick and concrete manufacturing plant to be erected at Erie, Pa., from plans drawn by Harris & Richards, Philadelphia.

The Ziegler-Schryer Mfg. Co., Freeport, Ill., manufacturer of gas, gasoline and distillate engines, advises that it is completing an addition to its machine shops, 80 x 180 feet.

The Plainfield Mills Corporation, Plainfield, N. J., has begun work on the erection of an extensive mill building and power plant at Plainfield. Harold Lawton is vice president and general manager.

Osgood & Osgood, Widdicomb building, Grand Rapids, Mich., are preparing plans for a three-story rein-

forced concrete factory building for the Elliott Machine Co. The building will be 60 x 450 feet and will cost about $100,000.

The Rose Spring Bed Co. has been organized at Memphis, Tenn., and is erecting a plant for the manufacture of bed springs. A freight elevator will be installed in the building, while considerable metal-working machinery will be ordered.

Extensions will probably be made during the summer to the plant of the McCowen - Probst - Menau Co., Salem, Ind., which was incorporated recently with $40,000 capital stock. It makes bath-tubs, sinks and other enameled plumbers' supplies.

The Barr Brothers-Rogers Cutlery Co., formerly of Eugene, Ore., has acquired the plant of the White Ornamental Iron Co., at Oakland, Cal., and will commence operations on a big scale at the new plant in the manufacture of cutlery.

The Adams-Bagnall Electric Co., Cleveland, has let contract for a new manufacturing plant to be erected in that city. The new structure will be erected immediately and the works will be moved from the old location to the new as soon as completed.

The Parkhurst Die Casting Machine Co., Anderson, Ind., advises that it has established a die casting plant at Anderson and a similar plant at Dayton, O. A number of other die casting plants will be established in different parts of the country.

The Booth Demountable Rim Co., Cleveland, is erecting a one-story manufacturing building, 60 x 160 feet, at 1250 Military avenue, Detroit, and will move to the new location about July 1. This company has just purchased considerable new machinery.

The American Bridge Co. has taken a contract for fabricating the steel work in the new car building plant of the Haskell-Barker Car Co., Michigan City, Ind. About 2,500 tons of structural material will be used. A large amount of new equipment will be required in this plant.

The Severance Mfg. Co., Nashville, Tenn., which manufactures gas machines, is reported to be considering the establishment of several branch factories. It is now completing the installation of equipment at the Nashville plant, the A. E. Kinsey Co., Cincinnati, having secured the contract for the machinery.

It has been officially announced that plans are being prepared for an 11 - story automobile manufacturing building to be erected at 247 West Fifty-seventh street, New York. The Stevenson Construction Co., 270 Jackson avenue, Long Island City, will erect the building, which will be 60 x 90 feet, and is estimated to cost about $150,000. John M. Baker, 21 Jackson avenue, Long Island City, is the architect.

Power Plant Equipment

Roseland, La., is considering the construction of an electric light plant.

Nickerson, Kas., is planning the installation of a municipal electric light plant.

Dr. V. S. Cheyney, Willard, New Mex., will install a 20-horsepower gasoline engine.

The Amador Electric Light & Power Co. will erect a large sub-station at Jackson, Cal.

The Tulare Power Co., Tulare, Cal., is preparing to erect a steam auxiliary power plant and several substations.

The Milwaukee city council will employ an engineer to prepare plans and specifications for a municipal lighting plant.

H. M. Byllesby & Co., Chicago, contemplate the enlargement of the plant of the Interstate Light & Power Co., at Galena, Ill.

The village of Browns Valley, Minn., will install a municipal light plant, using a gas engine and gas producer for generating power.

The Bowyer Gold & Copper Co., Boise, Id., will install an 18-horsepower hoist, a 10-horsepower engine and a cycle bearing blower.

Minocqua, Wis., will receive bids until July 6, for the construction of an electric light plant. W. B. Fisher is chairman of the town board.

The John D. G. Duncan Co., Knoxville, Tenn., is asking for quotations on a second hand, return tubular boiler, having 150 horsepower capacity.

The Indiana & Muncie Electric Co., Elkhart, Ind., is preparing to ask bids for the rebuilding of a dam in St. Joseph river and for the erection of a power plant.

A vote will be held at North Yakima, Wash., July 1, to decide on a $300,000 bond issue, the proceeds to be used for constructing an electric lighting plant.

The Scofield Engineering Co., Arcade building, Philadelphia, is asking for bids on a power house and equipment for the Helena Gas & Electric Co., Helena, Ark.

A power plant with 400 horsepower capacity will be installed in the plant of the Georgia Marble Finishing Works at Canton, Ga. The plant was recently burned, but will be rebuilt at once.

The Falls City Construction Co., Louisville, Ky., will probably be in the market for a power plant for a 10-story office building, which it is erecting in that city. Address Harry B. Lewman.

Bids will be received about July 1, at Gunnison, Colo., for the purchase of $90,000 in bonds, to be used for the construction of a hydro-electric plant to furnish water and power to the city of Gunnison.

Francis G. Ward, commissioner of public works, Perrysburg, N. Y., is asking for bids for erecting and equipping a power plant at the J. N. Adam Memorial Hospital. Specifications may be had on application.

The Imperial Valley Oil & Cotton Co. will rebuild its gin damaged by fire some time ago. A 100-horsepower gasoline engine will replace the steam power heretofore in use. The new plant will be at Calexico, Cal.

The Citizens Gas, Electric & Heating Co., Mt. Vernon, Ill., will remodel its electrical plant and will install new engines, generators, dynamos, etc. An electric pump will also be purchased for the water pumping station.

The Cleveland Construction Co., 606 Citizens building, Cleveland, is taking bids on the condensing equipment for the hydro-electric power plant of the Northern Ohio Traction & Light Co., Akron, O. This includes pumps, feed water heaters, condensers, engines, etc.

The Hydro-Electric Co. has been organized at Hood River, Ore., for the purpose of developing two large power sites; $250,000 has been subscribed for the work of constructing dams and installing power plants. H. J. Jackson, Portland, Ore., is one of the directors.

The new power station to be erected by the Kentucky Traction & Terminal Co. at Lexington, Ky., is to have a capacity of 4,750 kilowatts, according to plans which have been drawn. The work is to be done in the immediate future, improvements contemplated to have an aggregate cost of $800,000.

Press reports state that plans are being prepared by the Frank J. Gould interests to establish one or more hydro-electric plants on the Roanoke river, to develop about 25,000 horsepower. The plants will be operated by the recently organized Virginia & Carolina Power Co., Richmond, Va. W. C. Whitney, New York, is president of the power company.

The Cleveland Construction Co., 606 Citizens building, Cleveland, is taking bids on the condensing equipment for the J. R. Nut power plant at Fort Worth, Tex. This will include: Turbines; motor, steam and turbine driven pumps; feed water heaters; feed

water pumps; closed surface condensers and a cooling tower. The contract for the electrical equipment for this plant was awarded to the General Electric Co.

The Ellsworth Collieries Co. is arranging to install at Ellsworth, Pa., a central plant for generating and distributing electric power to the several mines operated by the company. The company has awarded a contract to the General Electric Co. for one 750-kilowatt, 60-cycle, 2,300-volt generator, driven by a mixed pressure Curtis turbine and one 360-kilowatt, 60-cycle, 2,300-volt belt-driven generator, one motor generator exciter, one belted exciter and switchboard.

Miscellaneous

The Reeves Mfg. Co., Canal Dover, O., is reported to have awarded a contract for four new sheet mills.

The J. I. Case Threshing Machine Co. is erecting a new warehouse at Eleventh street and Broadway, Louisville, Ky. The only equipment required is a freight elevator of large capacity.

The Henry Vogt Machine Co., Louisville, Ky., will install two 250-horsepower water-tube boilers in the plant of the Fayetteville, Ark., Electric Light & Power Co., and two 150-horsepower return tubular boilers for the Dixie Cotton Oil Co., Little Rock, Ark.

Hugh John Reilly Jr., Cienfuegos, Cuba, is at present in New York securing estimates on various kinds of machinery and materials to be used in the construction of the Cienfuegos, Palmira & Couces Electric Power & Railway Co.'s lines and plants. The Cuban government has awarded valuable concessions to the company, covering rights of way for electric lines, and grants of hydro-electric power sites along the Hanabanilla and Negros rivers. The railroad will be standard gage and will cover a large area of sugar growing country as well as forming connecting links between a number of towns. Communications should be addressed to Hugh John Reilly Jr., Cienfuegos, Cuba, after July 15.

Government News

Bids will be opened at 2:30 p. m., July 11, by Major F. C. Boggs, corps of engineers, United States army, general purchasing agent of the Isthmian canal commission, Washington, D. C., under circular 636-D, for furnishing brass bolts, nuts and screws. A copy of the specifications can be obtained from the Washington office, and also from offices at 24 State street, New York City; 614 Whitney Central building, New Orleans, La.; and 1086 North Point street, San Francisco, also from the United States engineer offices in Chicago and St. Louis.

Bids will be opened on July 6, by the commanding officer Watertown arsenal for selling 100,000 pounds of condemned scrap iron and steel, 150,000 pounds of steel turnings, 30,000 pounds of cast iron borings, 500 pounds of mixed turnings, 12,000 pounds of bronze turnings, 1,000 pounds of copper wire, 600 pounds of brass skimmings, 111 barrels of oil and 20 carboys.

The superintendent of prisons, justice department, Washington, D. C., will open bids at 10 o'clock July 18, for installing cast iron stairways and elevator door sills in the hospital buildings at the United States penitentiaries, Atlanta, Ga., and Leavenworth, Kas.

The secretary of the interior, Washington, D. C., will open bids at 2 o'clock, p. m., on July 3, for the installation of a coal and ash handling plant at the old United States post office building, Washington, D. C.

Bids will be opened Tuesday, July 11, at 10 a. m. at the bureau of supplies and accounts, navy department, Washington, D. C., for furnishing materials for various navy yards in the east:

BROOKLYN.

Schedule 3725, 2 pneumatic hammers.
Schedule 3725, 1,000 pad-locks.
Schedule 3725, 18,000 pounds of steel wire nails.

PHILADELPHIA.

Schedule 3725, 300 pad-locks.

BOSTON.

Schedule 3727, 5,700 pounds of naval brass rod.
Schedule 3727, 860 pounds of sheet brass.
Schedule 3727, 750 pounds of copper sheet.
Schedule 3723, 6,000 pounds of sheet zinc.

The following bids were opened by the Isthmian canal commission, Washington, D. C., June 22, for furnishing cargo-handling and locomotive cranes, gasoline engine driven passenger car, rock skips, chaplets, electric cable and cable terminals.

Class 1, 8 electric cargo-handling cranes complete; 2, 3 locomotive cranes; 3, gasoline engine-driven passenger car and 12 rattan armchairs suitable for use in above car; 4, 32 rock skips, complete with front and back slinging chains, hooks, shackles, and rings; 5, 13 perforated tin chaplets; 6, 2,500 feet lead-covered paper insulated cable; 7, 5 strips of protectors and 7 cable terminals.

Allis Chalmers Co., Milwaukee, Class 4, $17,934, time 130 days, delivery at Colon.

American Electrical Works, Rumford, R. I. Class 6, $320, time 27 days, delivery at Colon.

Berry & Aikens, Philadelphia, Pa., Class 5, $306, time 60 days, delivery at Colon.

Brown Hoisting Machinery Co., Cleveland, Class 1, $96,000, time 200 days, delivery at pier 67 New York City, 2, $25,950, time 110 days, delivery at Ancon.

Cleveland Crane & Engineering Co., Wickliffe, O., Class 1, for using crane type motors, $92,120, for using mill type motors $95,768, time 8 months, delivery at pier 67 New York City.

Cockburn Co., Jersey City, N. J., Class 4, $11,040, time 60 days, delivery at Colon.

Dover Boiler Works, Dover, N. J., Class 4, $7,520, time 75 days, delivery at Colon.

Engineering Construction Co., New York City, Class 4, $14,336, time 90 days, delivery at Colon.

Exeter Machine Works, Pittston, Pa., Class 4, $14,944, time 60 days, delivery at Colon.

Fox Bros. Co., New York City, Class 4, $13,816, time 79 days, delivery at Colon.

James G. Heggie, Joliet, Ill., Class 4, $10,080, time 90 days, delivery at Colon.

Industrial Works, Bay City, Mich., Class 2, $33,000, time 100 days, delivery at Colon.

Kito Boiler & Tank Co., Canton, O., Class 4, $7,872, time 90 days, delivery at Colon.

The Maine Electric Co., Portland, Me., Class 1, $83,726, using mill type motors, time 240 days, delivery at pier 67 New York City.

The McMyler Interstate Co., Bedford, O., Class 1, $112,800, using crane type motors, $120,000, using mill type motors, time 240 days, delivery at Colon; 2, $34,425, time 45 days, delivery at Colon.

N. J. Foundry & Machine Co., New York City, Class 4, $10,836.16, time 100 days, delivery at Colon.

S. Obermayer Co., Cincinnati, O., Class 5, $301, time 40 days, delivery at Colon.

William J. Oliver Mfg. Co., Knoxville, Tenn., Class 4, $9,952, time 70 days, delivery at Colon.

Petroleum Iron Works Co., Sharon, Pa., Class 4, $12,704, time 90 days, delivery at Colon.

M. H. Treadwell Co., New York City, Class 4, $11,168, time 70 days, delivery at Colon.

Vermilye & Power, New York City, Class 5, $134 (part), time 25 days; delivery at Colon.

Wellman-Seaver-Morgan Co., Cleveland, Class 1, $107,200, using crane type motors, $103,376 using other types of motors, time 240 days, delivery at pier 67 New York City.

Western Electric Co., New York City, Class 6, $285, time 42 days, delivery at Colon, class 7, $109.70, time 42 days, delivery at Colon.

Browning Engineering Co., Cleveland, O., Class 2, $27,750, time first crane 30 days, second crane 45 days, third crane 60 days, delivery at Colon.

C. W. Hunt Co., West New Brighton, N. Y., Class 1, $118,560, time 240 days, delivery at pier 67 New York City.

Manning, Maxwell & Moore, New York City, Class 1, $105,848, time 240 days, delivery at Colon. The price of this bid is for delivery at Colon, but the time of delivery is for pier 67 New York City.

General Electric Co., Schenectady, N. Y., Class 3, $29,316, time 210 days, delivery at Colon.

Union Foundry & Machine Co., Pittsburg, Pa., Class 4, $9,372.48, time 65 days, delivery at Colon.

Bids were opened at the navy department, bureau of supplies and accounts, June 20, as follows:

PRESS—Schedule 3597, Class 1, Mare Island: 1 Hydraulic forcing press: Camden Iron Works, $860; Griscom-Spencer Co., N. Y., $816; Edgar M. Moore, Pittsburg, $910.96; Manning, Maxwell & Moore, N. Y., $849; Niles-Bement-Pond Co., N. Y., $1,035; Eccles & Smith, San Francisco, $955; Watson-Stillman Co., N. Y., $850.

LATHES—Schedule 3636, Class 62, 8 motor-driven back-geared, screw-cutting engine lathes, 5 for Norfolk, 3 for Boston: Fairbanks Co., Washington, D. C., $1,136; Frevert Machinery Co., New York, $948.75; Griscom-Spencer Co., N. Y., $845.30; Garvin Machine Co., N. Y., $952.25; J. P. Kemp, Baltimore, $924.50 and $890; Manning, Maxwell & Moore, N. Y., $892; $1,057.50, $835 and $1,163; Niles-Bement-Pond Co., N. Y., $1,045; Prentiss Tool & Supply Co., N. Y., $895.

BORING MILL—Schedule 3637, Class 63, Portsmouth, N. H.—1 extension boring and turning mill: Manning, Maxwell & Moore, N. Y., $9,995; Niles-Bement-Pond Co., $9,775; Prentiss Tool & Supply Co., N. Y., $9,877 and $9,815; Wm. Seilers & Co., Philadelphia, $12,700 and $11,735.

CRANE—Schedule 3638, Class 71, Indian Head, Md.—1 locomotive crane, 5-ton: American Hoist & Derrick Co., St. Paul, $7,962; Browning Engineering Co., Cleveland, $5,395; Brown Hoisting Machinery Co., Cleveland, $6,350; McMyler Interstate Co., Bedford, O., $5,135; Orton & Steinbrenner Co., Chicago, $5,375; Ohio Locomotive Crane Co., Bucyrus, O., $5,750.

TOOL STEEL—Class 114, Boston—22,700 pounds special, treatment steel: Carnegie Steel Co., Philadelphia, 0.1275.

(In order to assist the post office in delivering letters to new concerns, it is suggested that the names of incorporators be written in the lower left hand part of every envelope addressed to such new companies.)

New Buyers

The following manufacturing companies have filed articles of incorporation:

Superior Metal Products Co., Elyria, O.; $15,000; by H. E. Hall and others.

Eureka Steel Co., Pittsburg; $25,000; John J. Rattigan, treasurer, Homestead, Pa.

Paul Stan Co., Homestead, Pa.; iron and steel; $10,000; Edward E. Franenheim, treasurer.

American Steel & Iron Co., Scottdale, Pa.; $5,000; by J. A. Stauffer, treasurer, Scottdale, Pa.

Pittsburg Steel Forging Co., Pittsburg; $10,000; by S. A. Fritz, S. Fritz and R. J. Dodds, Pittsburg.

The National Foundry & Machine Co., Spartansburg, S. C.; $15,000; by George W. Nichols and John G. Evans.

Superior Metal Products Co., Elyria, O.; $15,000; by M. E. Hall, L. H. Lang, L. J. Zeager, M. C. Powers and U. J. Smith.

Mead Foundry & Casting Co., Cleveland; $15,000; by P. D. Crane, B. A. Crane, M. D. Crane, P. R. Mooren and Joseph Moore.

The Bloomer Machine Works Co., Bloomer, Chippewa county, Wis.; $25,000; by Joseph Barcume, Ray F. German and Charles Keller.

The Union Bronze Co., Jersey City, N. J.; $150,000; to manufacture and deal in bronze; by Richard Backert, Joseph Tormey and William Brendle.

The Indianapolis Gas Engine Co., Indianapolis; $10,000; manufacturers; incorporators, Thomas Strack, W. P. Best, H. A. Noffke, Ray Carmichael and B. N. Lay.

United Engine & Mfg. Co., Hanover, Pa.; thermal engines, tractors and accessories; $20,000; by Robert E. Manley, 595 Madison avenue, New York City.

The Geneva Plow Mfg. Co., Geneva, Ala.; $35,000; by President J. R. Clark, Vice President R. L. Martin, and Secretary and Treasurer W. B. Hammond.

The Eastern Blower & Sheet Metal Works, Richmond, Va.; $25,000; by D. F. Harrington, president; N. E. Reuter, vice president; H. C. Hopkins, secretary and treasurer.

The Stanley Differential Hub Co., Logansport, Ind.; $60,000; to manufacture automobile parts; incorporators, E. D. Morgan, G. M. Stanley, Zachary Taylor, Clark Taylor and Joseph Taylor.

Ellwood City Iron & Wire Co., Ellwood City, Lawrence county, Pa.; structural iron and steel and ornamental iron and wire products; $15,000; by Samuel D. Johnston, treasurer, Ellwood City.

Stroh Steel Hardening Process Co., Pittsburg. Pa.; to treat iron, steel and other materials with a process for hardening; $30,000; by W. Y. Stroh, James R. Eyre, F. G. Wilhelm, W. F. Schatz and J. H. Henderson, all of Pittsburg.

New Construction

The Reynolds Wire Co., Dixon, Ill., advises that it is erecting a four-story addition, 52 x 150 feet, of reinforced concrete construction.

The Hancock Mfg. Co., Charlotte, Mich., manufacturer of brass goods, advises that it is erecting a small addition to its present plant.

The laboratory equipment for the new Oklahoma state school of mines will be installed by Allis-Chalmers Co., Milwaukee. Its value will be approximately $25,000.

Mayberry Bros., Claremont, Okla., are planning to rebuild their machine and plumbing shops recently damaged by fire. The building will be 40 x 80 feet and will cost $4,000.

The Oklahoma City Iron Works, Tulsa, Okla., has begun the construction of three additional brick buildings. The foundry will be 86 x 146 feet, the blacksmith shop 50 x 100 feet, and the pattern shop 32 x 70 feet.

Walsh's Holyoke Steam Boiler Works, Holyoke, Mass., advises that it has just completed an addition to its plant, 40x 80 feet. It expects to have the extension operating within a week.

The American Fork & Hoe Co. is taking bids on a three-story machine shop, 52 x 196 feet, for its Jackson, Mich., works. The plans were prepared by Anton Burchard, Cuyahoga building, Cleveland.

The Niagara Falls Metal Stamping Works, Niagara Falls, N. Y., has let contracts for an addition, two stories and basement, 60 x 100 feet. In the basement will be built a storage vault, 20 x 36 feet, for storing dies. It will be ready to occupy in August.

The Wrought Iron Range Co., St. Louis, has bought a tract of 11 acres along the terminal belt line, on which, it is said, the company will expend an estimated amount of $400,000 on new shops. The plant will include five buildings, one of which will be 300 x 300 feet.

The Rousch-White Machinery Co. has accepted a proposition from the Commercial club, of Stuttgart, Ark., to locate a foundry and machine shop in that city. It is expected by the company that beside doing general jobbing work, it will engage in the manufacture of bells, feed and cane mills.

The Gurney Heater Mfg. Co., 188 to 200 Franklin street, Boston, Mass., is erecting at South Framingham a new and modern plant which will be used exclusively for the manufacture of its several lines of steam and hot water boilers and radiators. A large foundry is a part of the new plant.

W. F. Owen, mechanical engineer, London, Eng., has announced that a proposed steel plant, to be financed by English capitalists, will be located on a 200-acre site on the Pitt river, Vancouver, B. C. The plant is to include blast furnaces, steel furnaces and rolling mills and is to have a capacity of 1,000 tons per day.

The Toledo Flanner Boiler Co., Toledo, O., has taken an option on a site of two acres in the Southside, St. Louis, on the Missouri Pacific railroad. Announcement is made that the company expects to build shops on the site to be operating about Oct. 1. The company will expend $100,000 on the shops, which will be operated as a branch to serve customers in the south and southwest.

The Ames Plow Co. has well under way the construction of a new plant and foundry at South Framingham, Mass. It is expected that the new plant will be completed and occupied during the late fall and the Worcester, Mass., plant of the company will

then be discontinued. Practically all the company's requirements as to construction and equipment installation have been closed.

General Industrial

The Dalton Adding Machine Co., St. Louis, has increased its capital stock from $1,000,000 to $1,500,000.

The Union Switch & Signal Co., Pittsburg, has increased its capital stock from $2,500,000 to $5,000,000.

The Keystone Sheet Metal Co., Ambridge, Pa., has filed notice of increase of capital stock from $50,000 to $100,000.

The stockholders of the Lozier Motor Co. have voted to increase the capital of the company from $2,000,000 to $3,000,000.

The American Road Machine Co., Kennett Square, Chester county, Pa., has increased its capital stock from $250,000 to $1,000.000.

The West Allis Iron Works Co., West Allis, Wis., has filed an amendment to its charter, increasing its capital stock from $10,000 to $25,000.

A. L. Boice, of Albion, Mich., has established a machine shop at Eaton Rapids, Mich., in connection with the Eaton Rapids Foundry Co.

An amendment has been filed to its articles of incorporation by the Mascot Stove Co., of Dalton, Ga., increasing its capital stock to $25,000.

The Des Moines Bridge & Iron Co., Des Moines, Ia., has filed an amendment to its articles of incorporation increasing its capital stock from $425,000 to $750,000.

The Benson Mfg. Co. has been incorporated by J. E., W. E. and B. F. Benson, Owensville, Ind.. to manufacture agricultural implements. The capital stock is $25,000.

The Independent Stove Co., Owosso, Mich., advises that its stock increase, recently noted, was made to take care of the company's rapidly increasing business. The company at this time does not intend to enlarge its plant.

The J. Young & Bros. Co., of Oconto, Wis., has been awarded the contract by the Chicago & Northwestern Railroad Co. for constructing two steel span bridges at $22,500. One will be located in Oconto county and the other in Oneida county, Wis.

Directors of the Brier Hill Coke Co., of Youngstown, O., recently held their annual meeting at Uniontown, Pa., at which these officers were elected: President, H. H. Stambaugh; vice president, R. C. Steese; treasurer, John Tod; secretary and general manager, Thomas McCaffrey.

F. T. Kimble, attorney, New York, has purchased at receiver's sale the old Vulcan Foundry Co.'s plant, which operated for years in the New Castle, Pa., district. It is reported that the property has been purchased for the Buffalo, Rochester & Pittsburg Railway Co., which has a terminal adjoining the foundry.

The Standard Corrugated Pipe Co., San Francisco, with main office at 402-4 Sheldon building and factory in South San Francisco, advising respecting its recently noted incorporation, says that it is manufacturing galvanized corrugated pipe, half pipe or arches and flumes, using the Newport Rolling Mill Co.'s open-hearth iron in its manufacture.

The Ohio Sterling Co., Dayton, O., which was recently incorporated with capital stock of $200,000, will take over the business of the old firm bearing that name. The plant was sold at public sale a week ago for $85,000. The incorporators of the new company are: Theo. C. Dye, Frank T. Huffman, Oscar M. Gottschall, W. L. Adamson and F. M. Dye.

Notice has been given by A. R. Smart, Oil City, Pa., receiver of the Russ Mfg. Co., of that place, that the property and equipment will be sold at receiver's sale, July 6. The equipment includes one 50-horsepower boiler, one 100-horsepower boiler, one Skinner engine, pumps, fans, scales, separator, elevators, blowers, pulley, valves, belting, grinding machine, tanks, tools, etc.

The Storm Equipment & Supply Co., 209 American National Bank building, Richmond, Va., has established a business in the sale of elevators, steam and gasoline engines, boilers, motors, generators, controllers, etc. The company at present is in the market for pumps, motors and other equipment for a complete hydro-electric plant; engine, boiler and supply pumps for a manufacturing plant, and other equipment.

The Commercial Motor Car Co., South Houston, Tex., which was recently organized, has purchased the plant of the Texas Engine & Mfg. Co., with all machinery, and the plant of a stove foundry. Operations will be commenced immediately and the capacity of the works will be one car a day. The officers of the company are: President, Z. Z. Brandon; vice president, R. E. Twyford; secretary and treasurer, L. J. Brandon, all of South Houston.

The Parkhurst Die Casting Machine Co., Anderson, Ind., whose incorporation was recently noted, advises that it has established a die casting plant at Anderson and a similar plant at Dayton, O. The company plans to establish such plants in the principal centers of the country, making use of the Parkhurst die casting machine. The officers of the company are President, Winfield T. Durbin; vice president, Layton M. Parkhurst; secretary-treasurer, William N. Durbin.

The National Steel Tank & Mfg. Co. has been organized by J. F. Cody, Edward M. Cody and W. D. Gordon, of Peoria, Ill., and R. D. Lackman and H. L. Ruhaak, of Pekin, Ill., with a capital stock of $25,000. The company will locate at Bradford, Ill., where it has leased works adapted and fully equipped for its needs. It has bought out the National Steel Tank Co., of Pekin, and the tank manufacturing business of Joseph F. Cody & Sons, of Peoria. It intends to add several items of manufacture, including a steel car coupling.

Trade Notes

The American Machinery & Supply Co., Oklahoma City, Okla., has established a manufacturers' agency in the State National Bank building, Oklahoma City.

The Homestead Valve Mfg. Co., Inc., Pittsburg, has arranged that Frederick K. Blanchard, 422 River street, Troy, N. Y., will represent it in Troy and Albany and that locality. He will carry a stock of Homestead valves for delivery on short notice.

J. G. Speidel, Reading, Pa., manufacturer of elevators, cranes, chain hoists, etc., is planning to establish a number of agencies in different sections of the country. He is now represented by the Nashville Machine Co., Nashville, Tenn., and by Fred. W. Walter, 33 Atlantic street, Norfolk, Va.

W. J. Linton, formerly Philadelphia branch manager for Wickes Bros., has opened an office at 136 Liberty street, New York, and will act as manufacturers' agent and dealer in new and second hand steam and electric power plant equipment, air compressors, hoisting engines and machine tools.

The Thomas B. Jeffery Co., of Illinois, distributor of Rambler cars, has moved its Chicago headquarters from lower Michigan avenue to 1008 Michigan avenue. The service department will continue at the old location for the time being. The new sales building contains 10,257 square feet of floor space for the display of cars.

Fires

Fire damaged the works of the Wells-Jones Plow Co., Jackson, Tenn., recently, the loss being estimated at $10,000.

The machine shop of M. Levy, at Fostoria, O., operated under lease by George Rosino, was seriously damaged, June 14. The loss is estimated at $3,500, partially insured.

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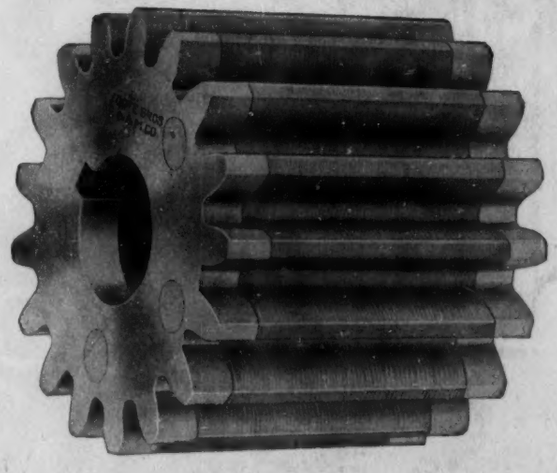

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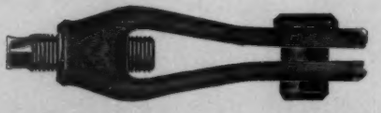

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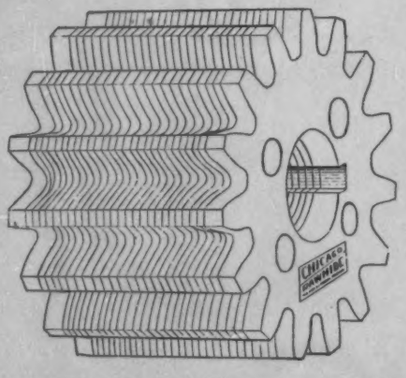

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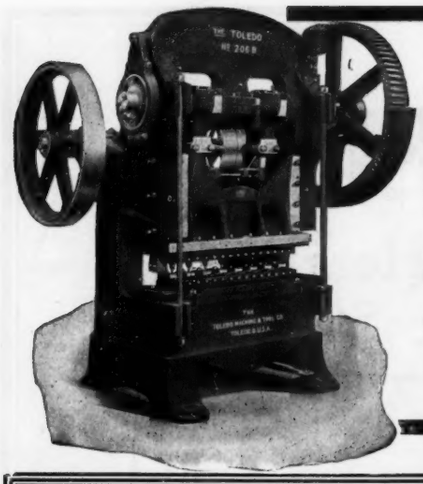

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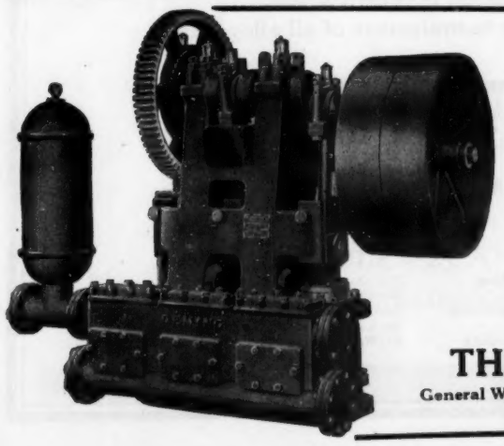

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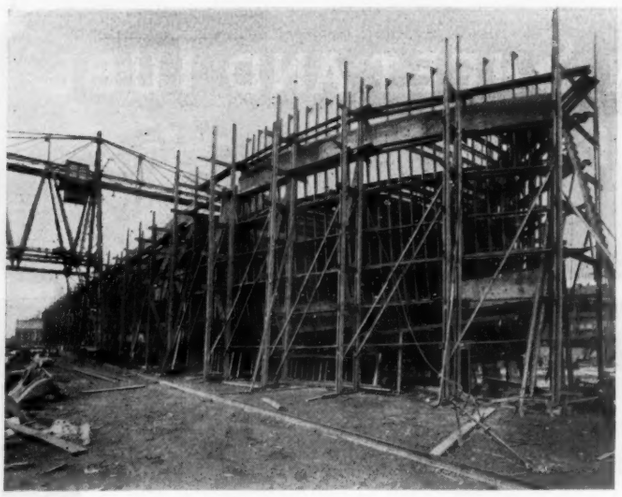

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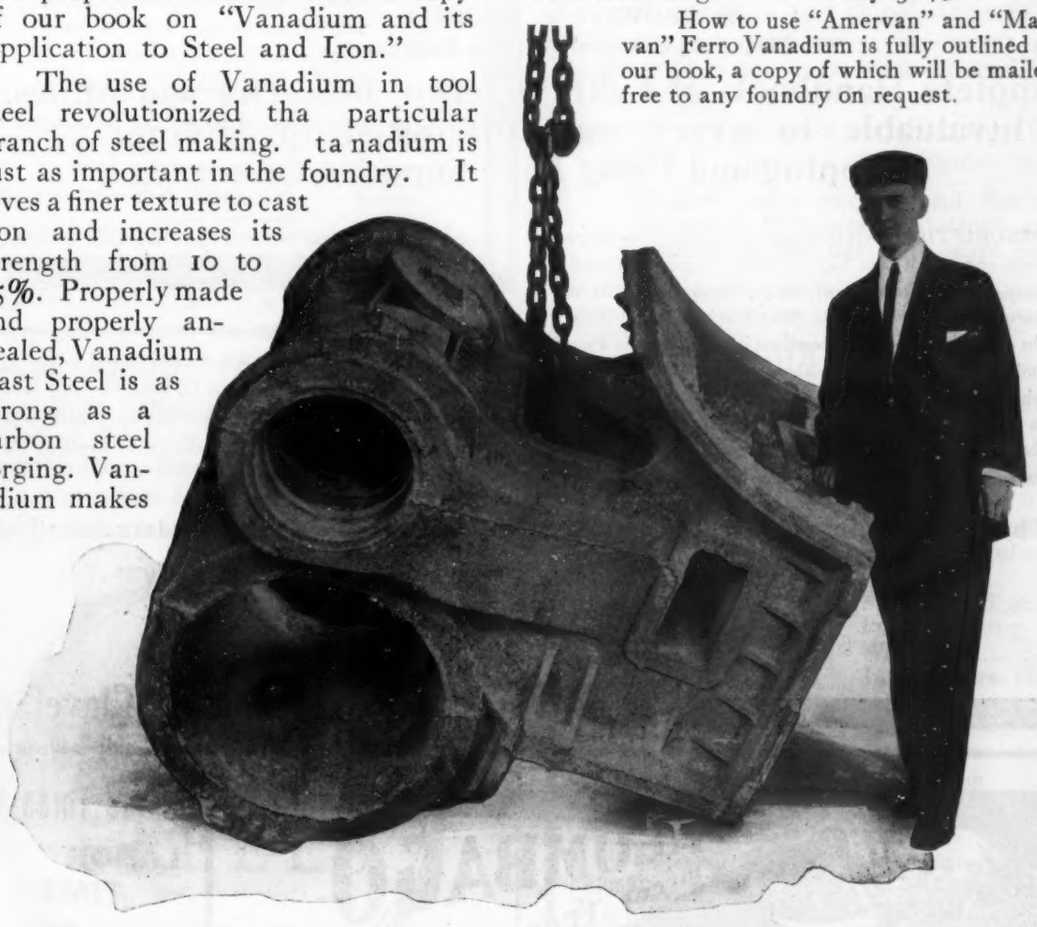

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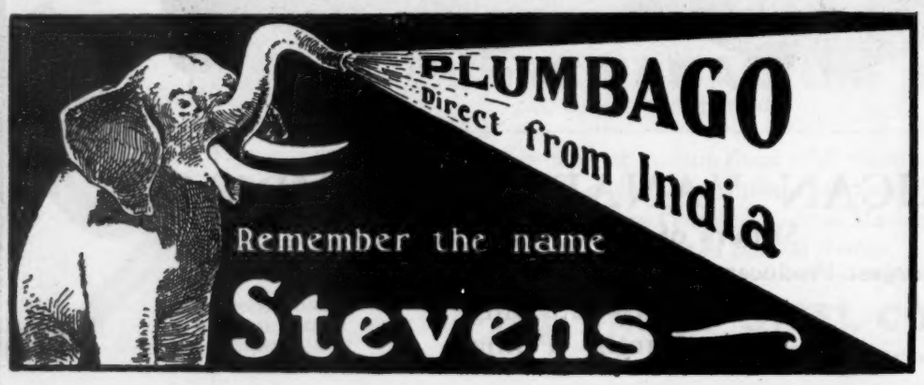

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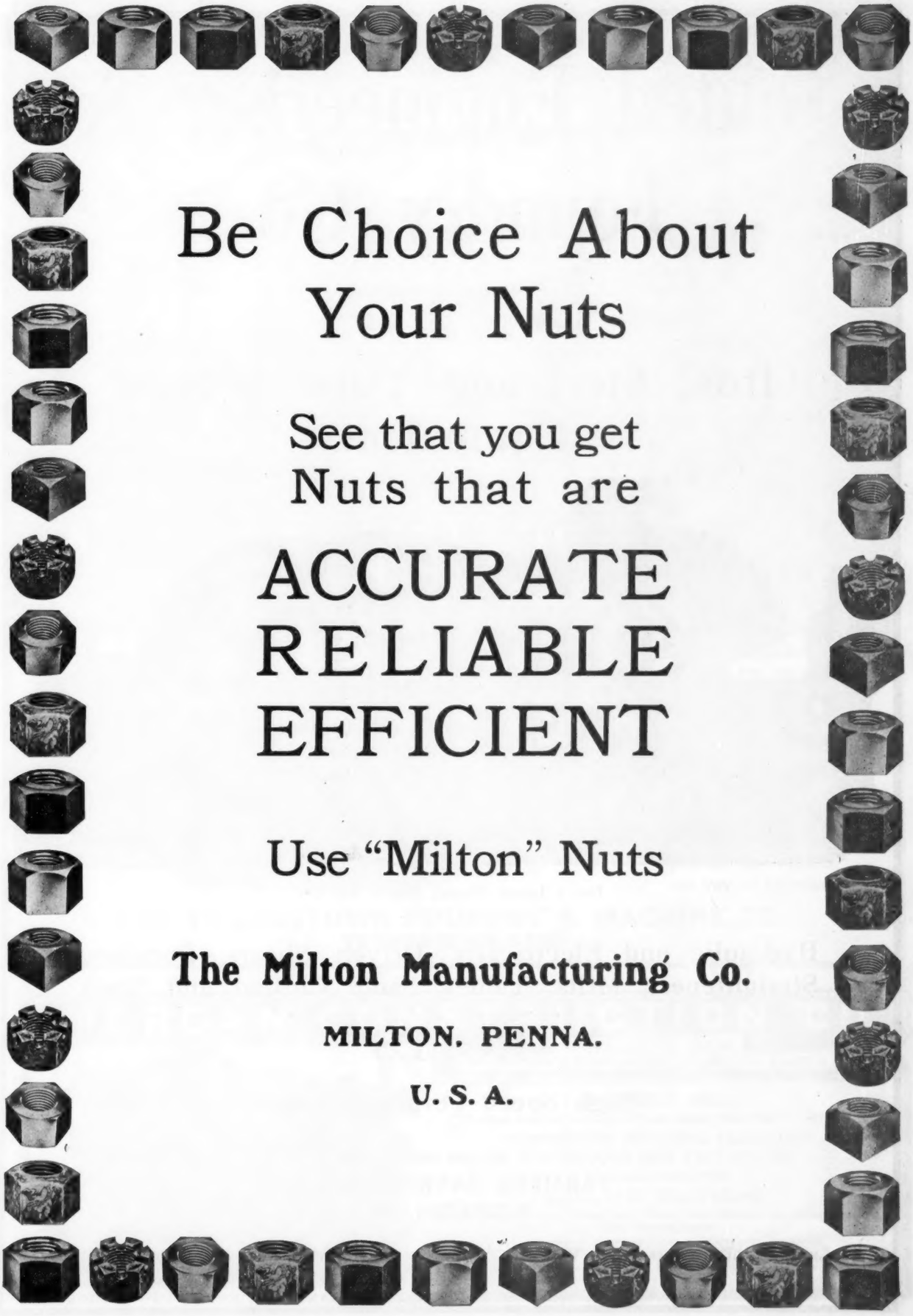

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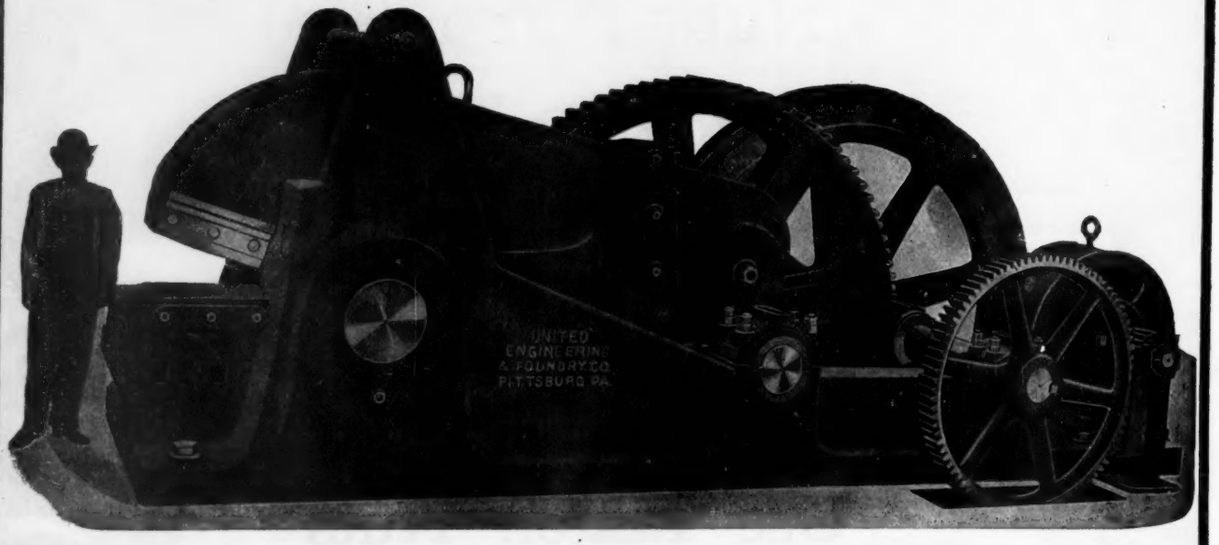

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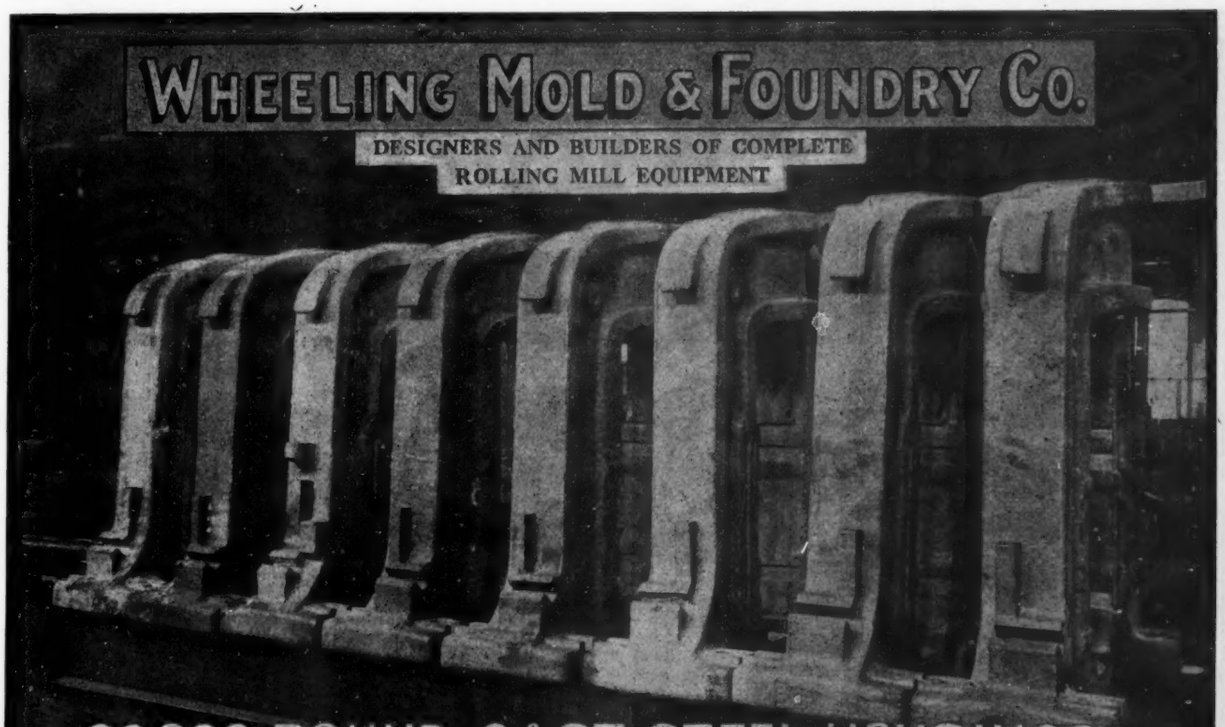

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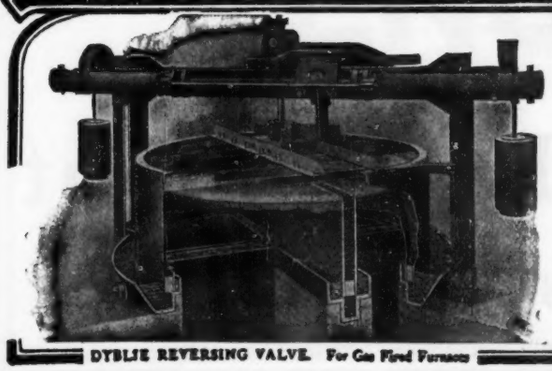

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For Billets, Merchant Bars, Light Structural Shapes, Hoops, Cotton Ties and Rods

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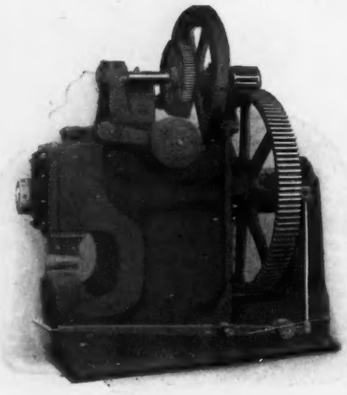
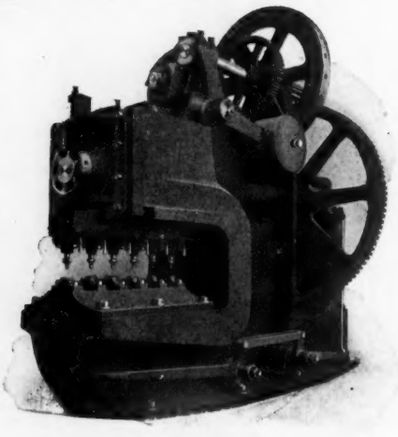
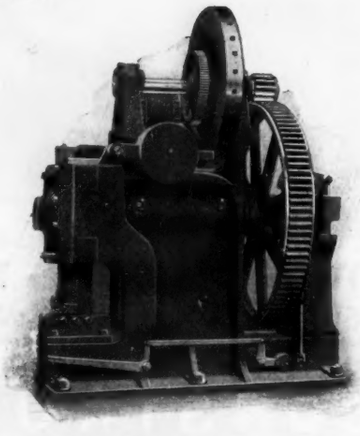


Bar Shear, Motor Driven,
Capacity 3-inch Square
Cold Mild Steel Bars



Heavy Multiple Punch
Motor Driven



Heavy Coping Machine,
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Steel Works Equipment

Shears, Punches, Saws, Coping Machines

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MACHINE COMPANY

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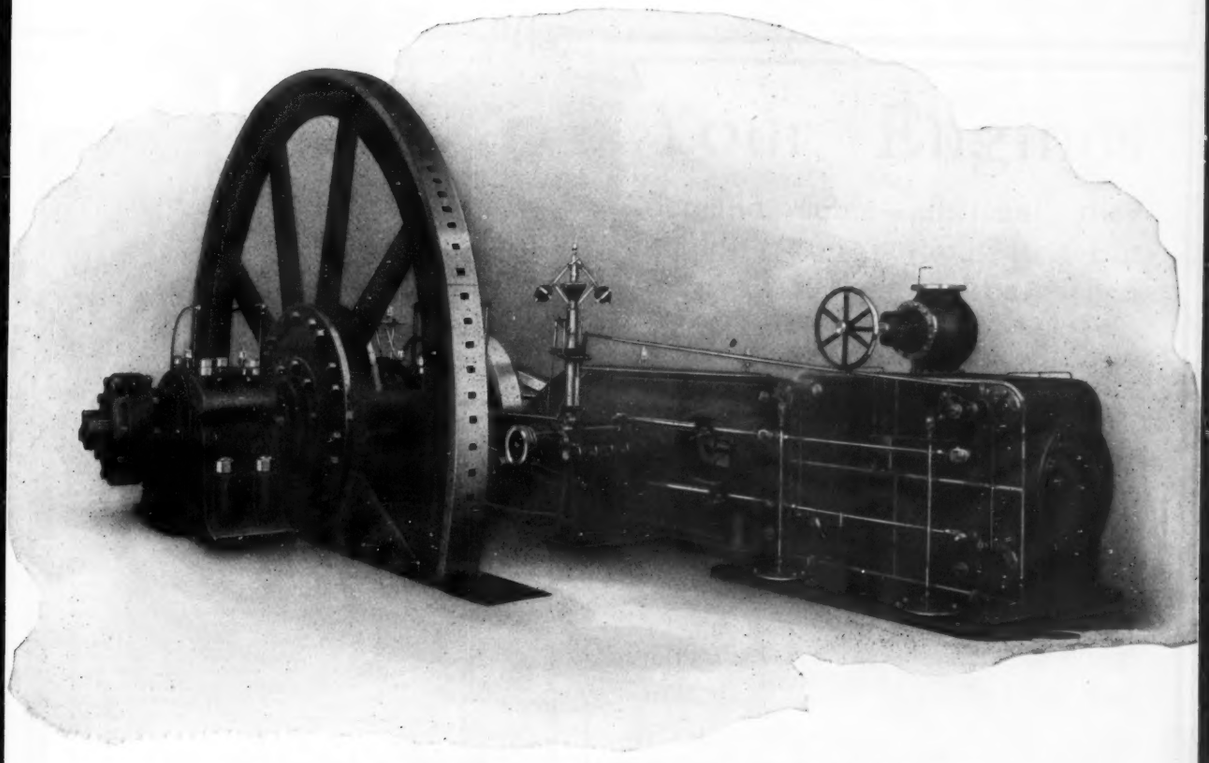

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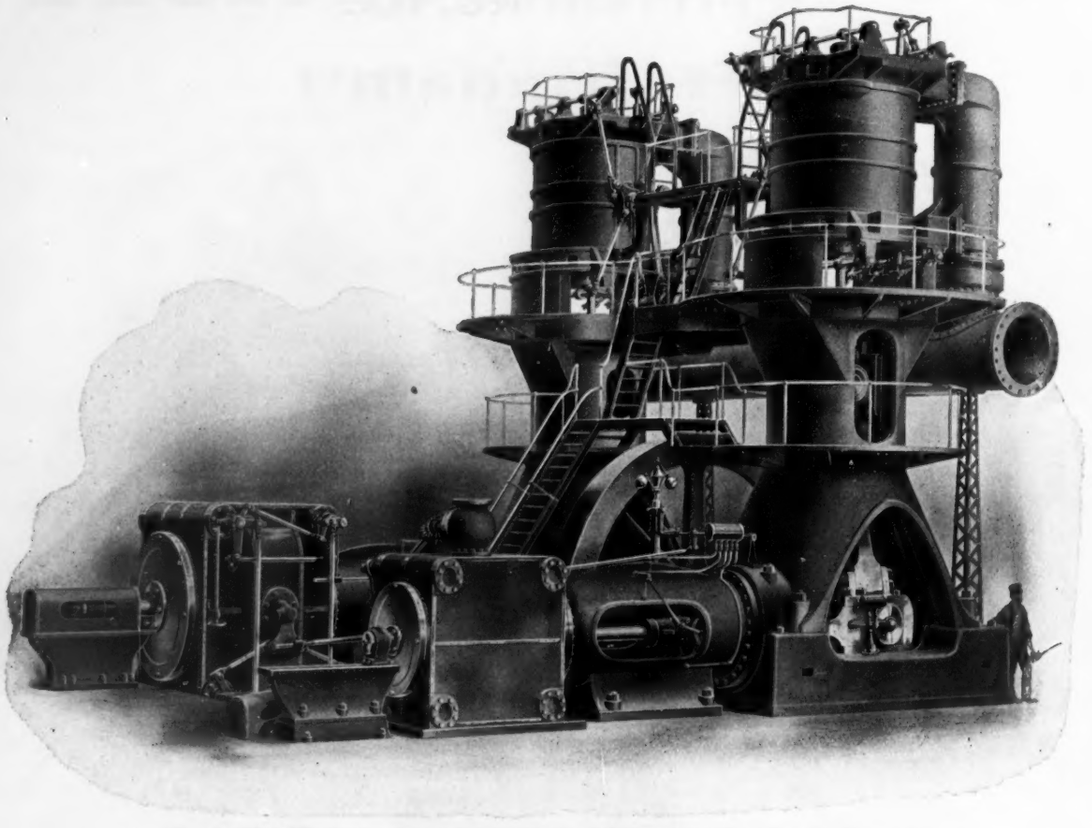

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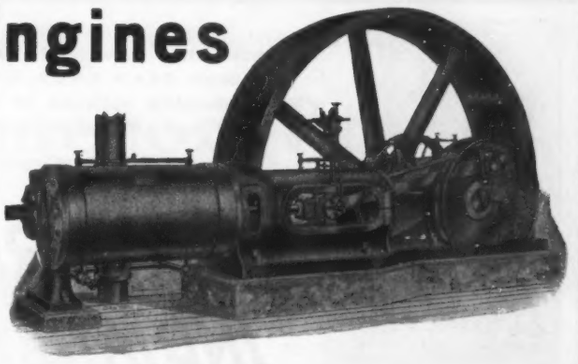

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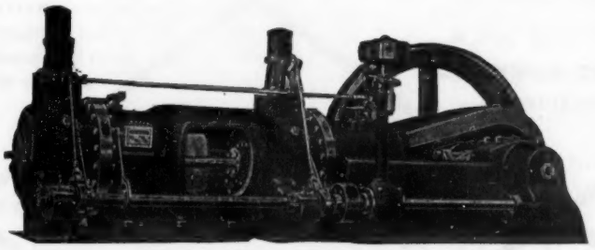

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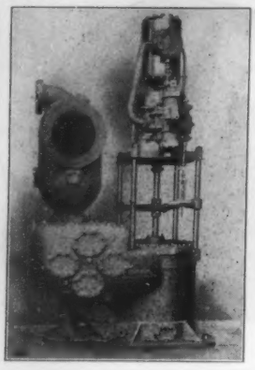

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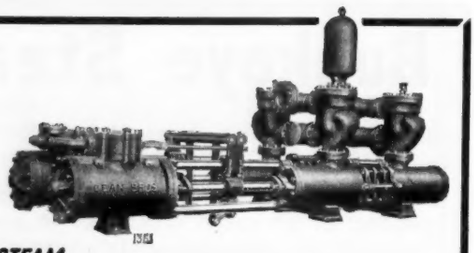

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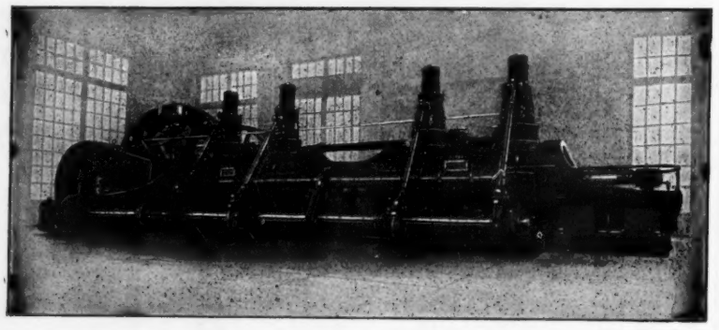

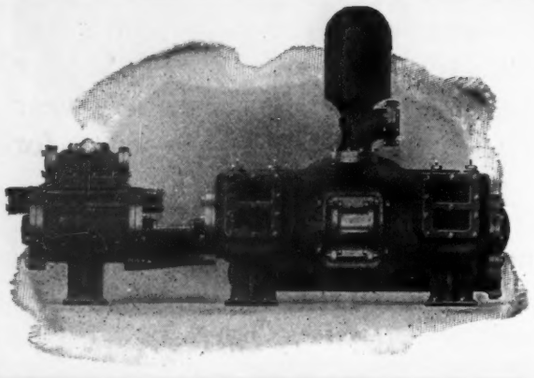

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Where there is a long suction line with high lift and with intermittent or continuous pumping, this type of Cameron Pump gives unusually excellent service.

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Cameron Pumps

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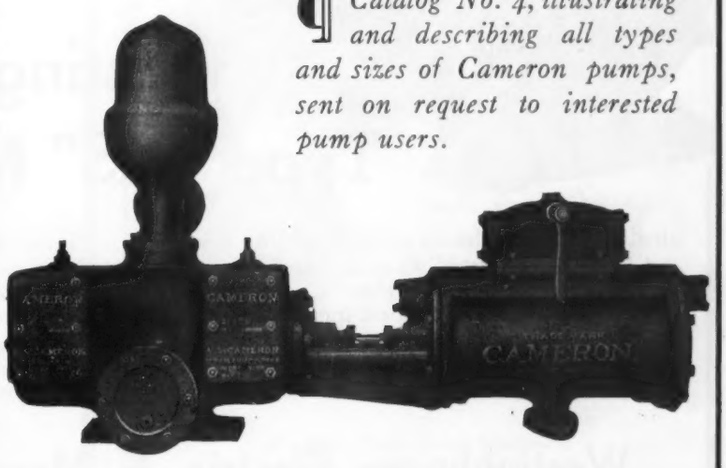

A. S. Cameron Steam Pump Works

Foot of East 23d Street, New York City

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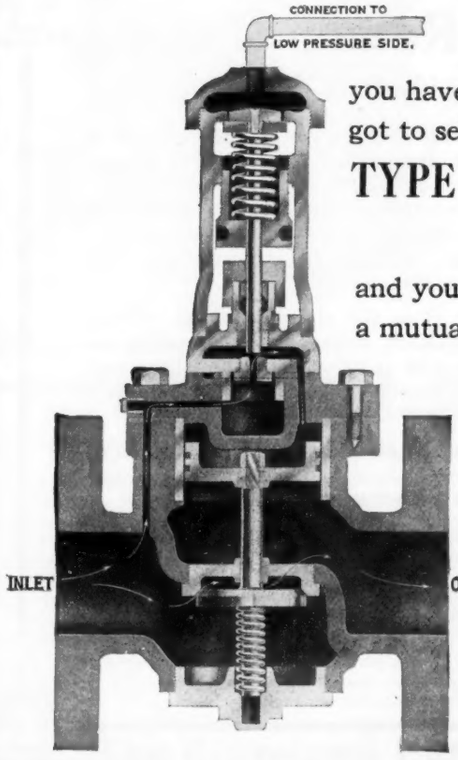

You say, "because we have something to sell;" and we say, "because you have something to buy." Now we have got to sell our

TYPE S STRONG PRESSURE REGULATOR OR PUMP GOVERNOR

and you have got to buy regulators, therefore, why not make a mutual arrangement: we to agree to send you TYPE S valves to meet your requirements, you to agree to give them a fair trial? Then if you like them send check, if you don't, send them back. Other steel mills use them. Why don't you try?

"On their merits alone we ask your patronage"

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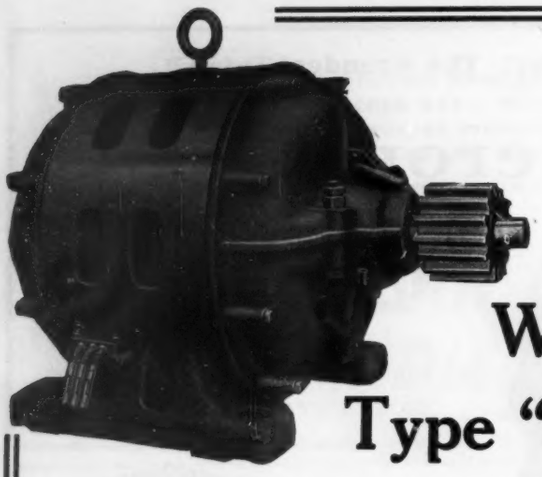

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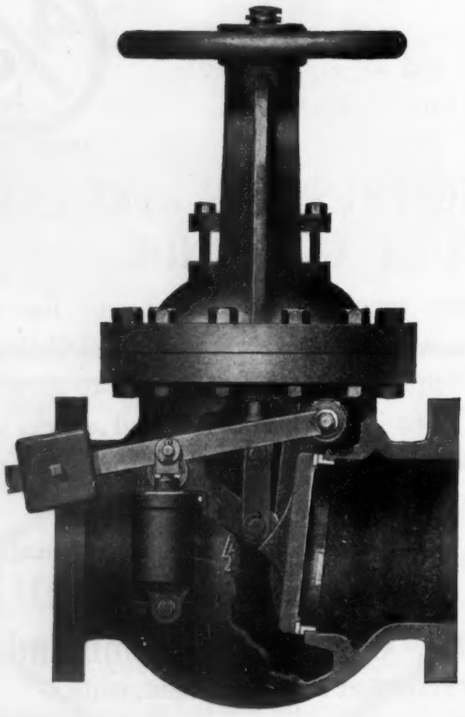

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Outside Dash-Pot Type

This valve was developed in response to a demand for a non-return valve which would visibly indicate the motion of the internal parts, and at the same time preclude any possibility of the valve remaining open in an emergency, through foreign substances working into the dash pot from the steam.

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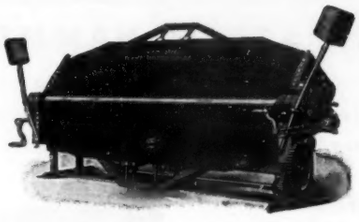

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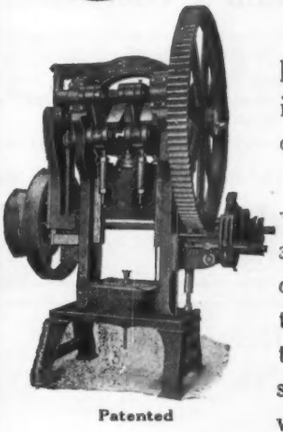

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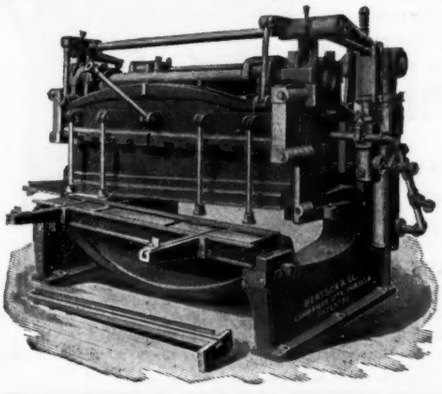

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This Hydraulic Plate Shear is built any required size up to 2 inch capacity. As it is operated by hydraulic pressure it is controllable at any point in the stroke. Note that it has our Patented Gag Holddown. We build a complete line of Shears, Punches and Bending Rolls.

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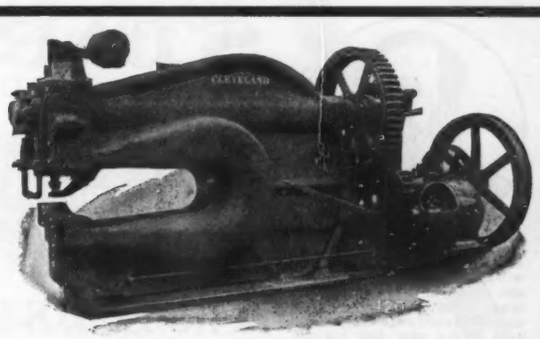

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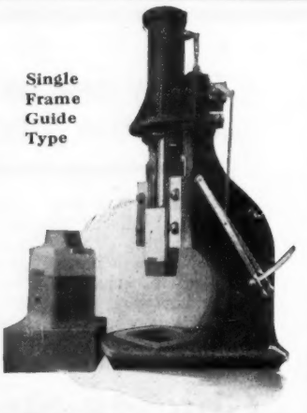

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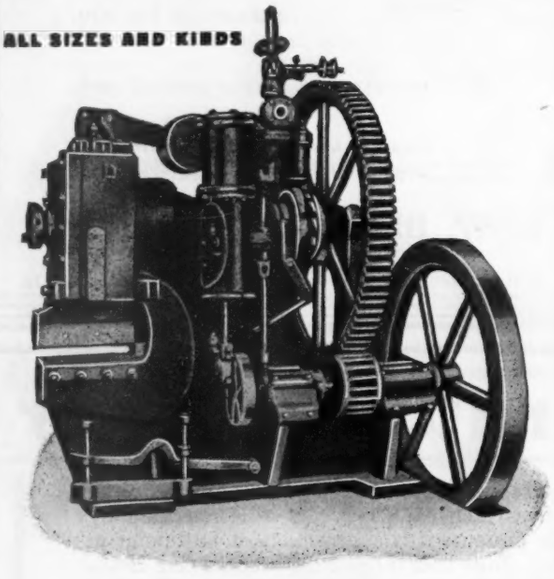

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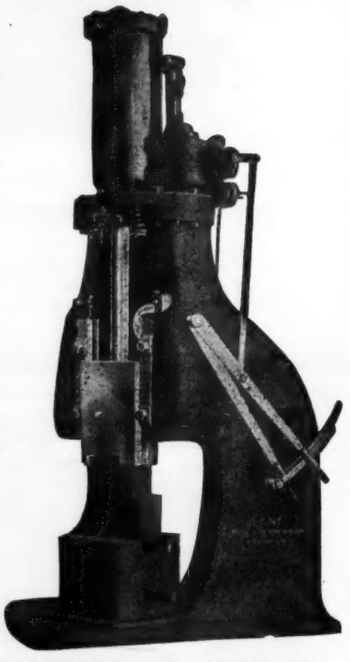

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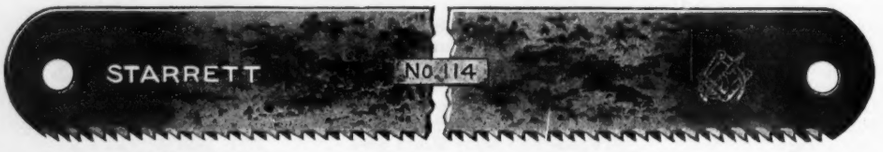

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PATENTED FEATURES

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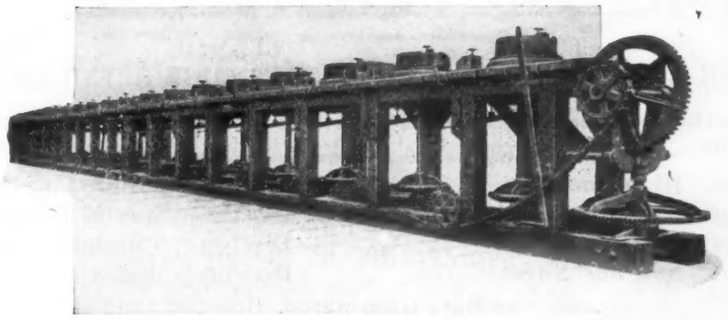

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EVER THE SAME

UNIFORM TOUGH ELASTIC LOWEST CARBON
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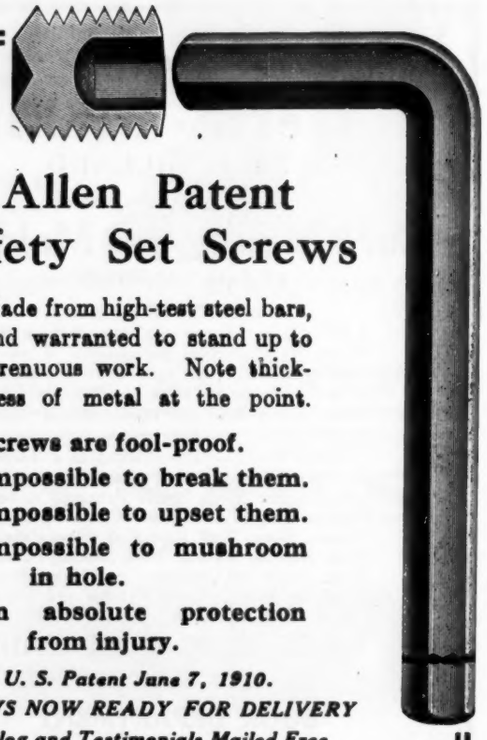

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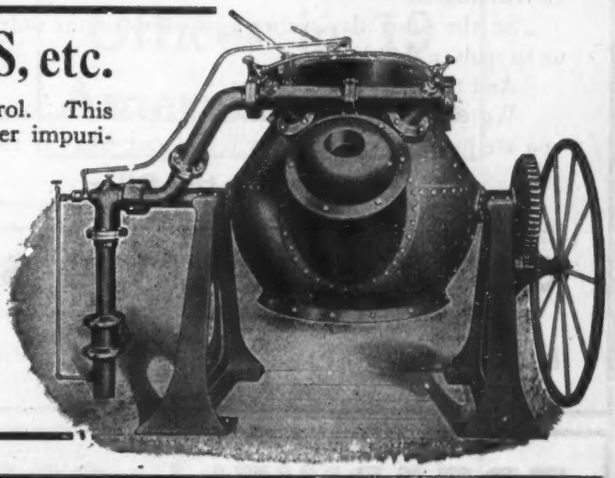

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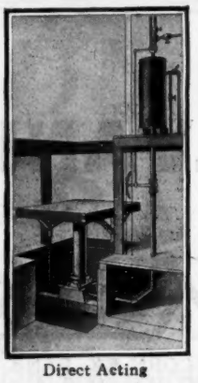

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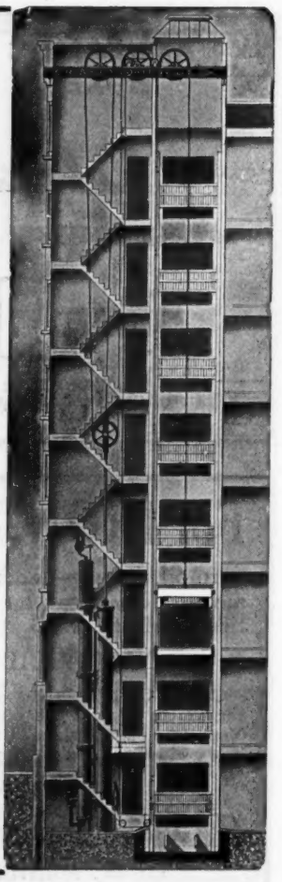

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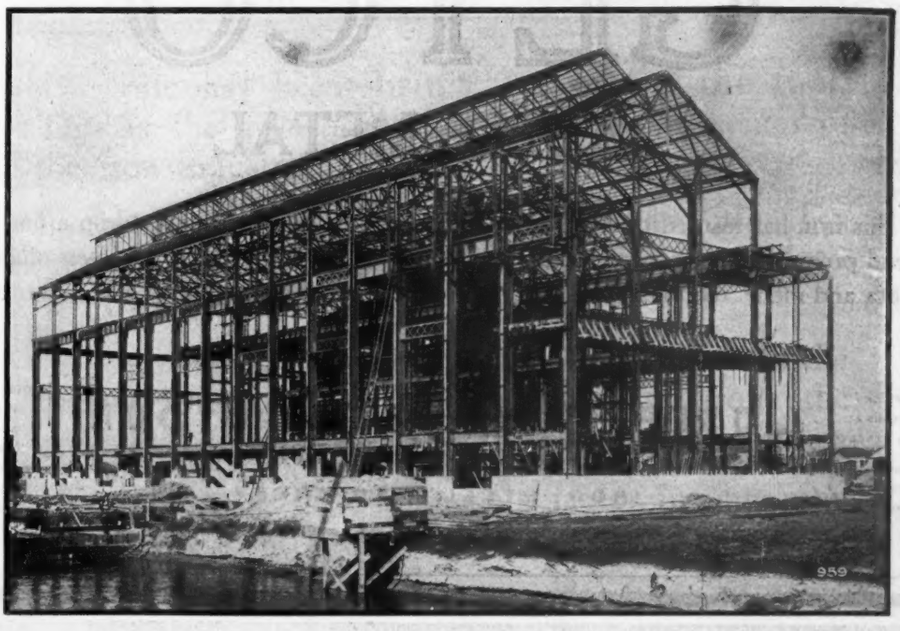

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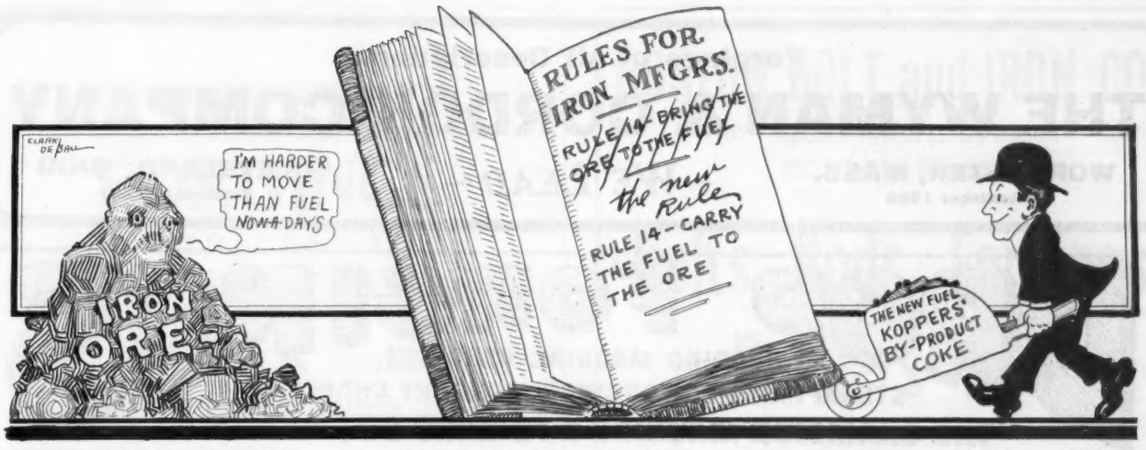
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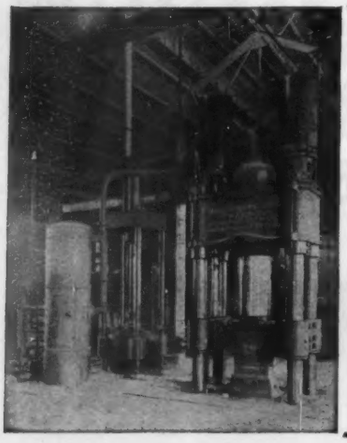
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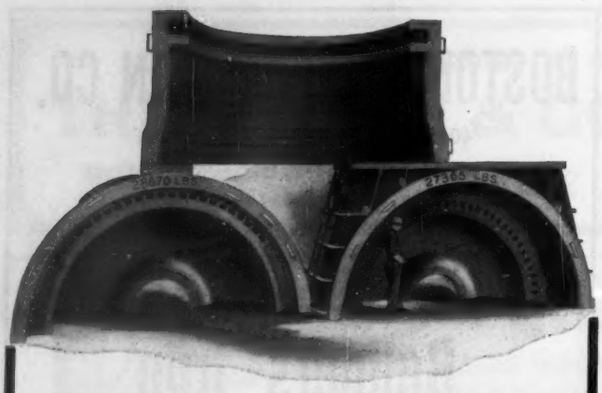

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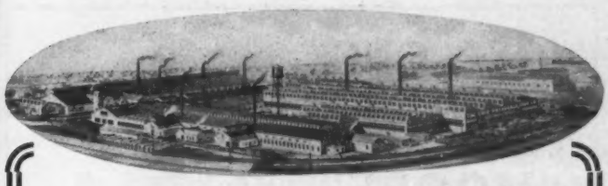

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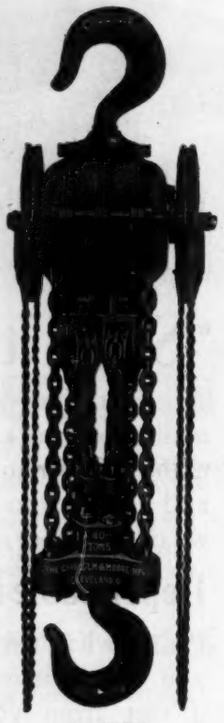

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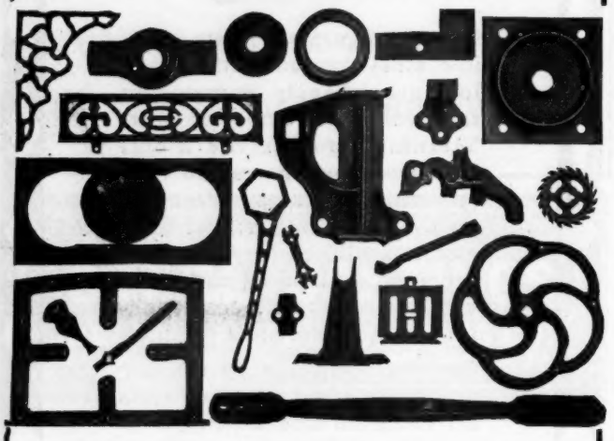

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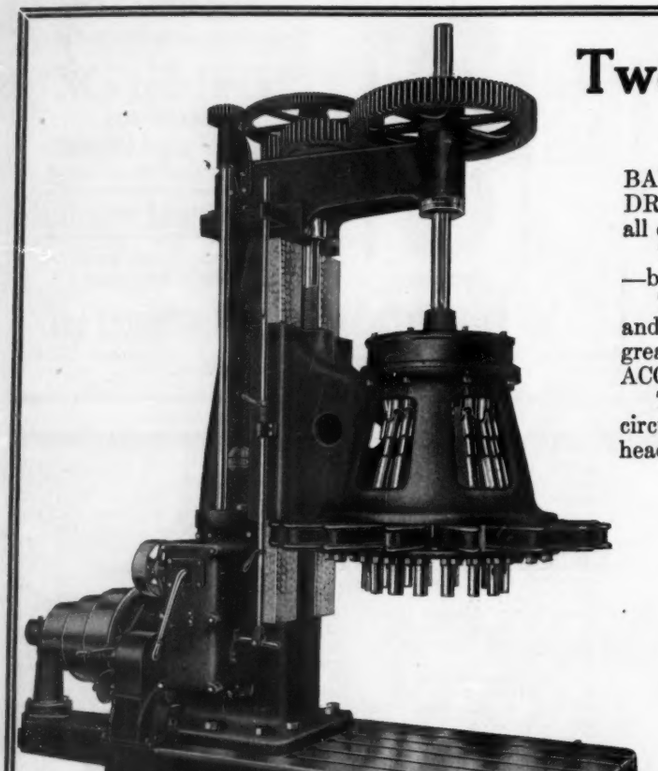

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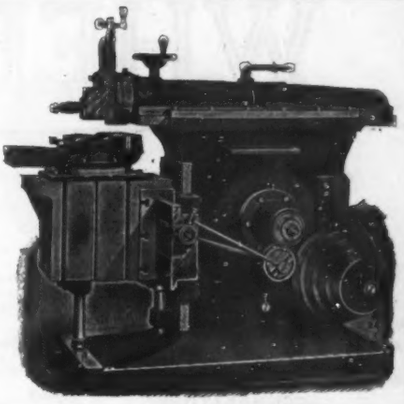

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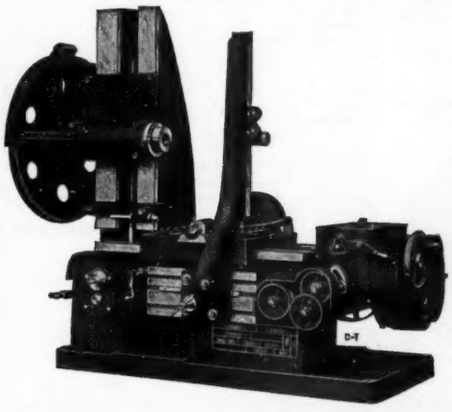

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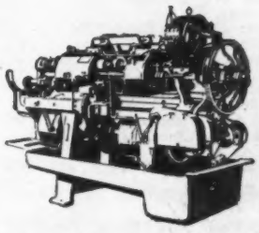

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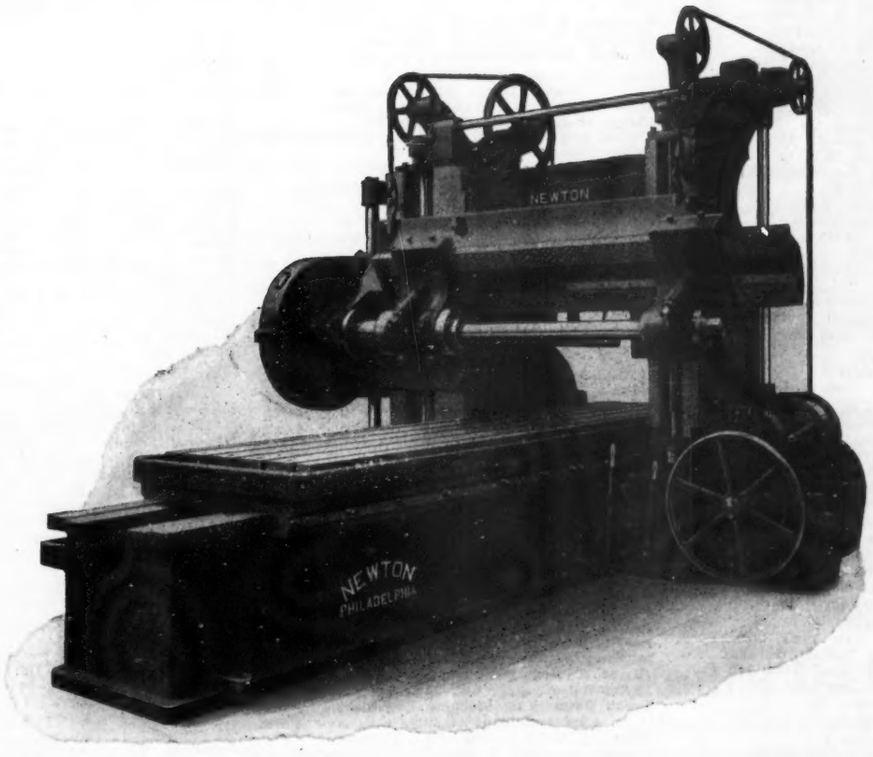

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Foreign Representatives: Berlin, Heinrich Dreyer. Vienna, Rudolf Salzer. Italy, Spain, Switzerland, Belgium, and France, Fenwick, Freres & Co., Paris, France. Montreal, Canada, Williams & Wilson. Yokohama, Japan, Manning, Maxwell & Moore.

WHERE TO BUY

BRAKES.
(Disc.)
Cutler-Hammer Clutch Co., Milwaukee, Wis.
Cutler-Hammer Mfg. Co., Milwaukee, Wis.

BRAKES.
(Electric.)
Electric Controller & Mfg. Co., Cleveland, O.

BRAKES.
(Power and Cornice.)
Dreis & Krump Mfg. Co., Chicago, Ill.

BRAZING.
(Custom.)
Champion Rivet Co., Cleveland, O.

BREAKERS.
(Circuit.)
General Electric Co., Schenectady, N. Y.
Westinghouse Elec. & Mfg. Co., Pittsburg, Pa.

BRICK AND CLAY.
(Fire.)
American Refractories Co., Chicago, Ill.
Ashland Fire Brick Co., Ashland, Ky.
Bickford Fire Brick Co., Curwensville, Pa.
Blackwell, Sons & Co., Ltd., Liverpool, Eng.
Clearfield Fire Brick Co., Clearfield, Pa.
Dover Fire Brick Co., Cleveland, O.
Garden City Sand Co., Chicago, Ill.
Harbison-Walker Refractories Co., Pittsburg.
Kier Fire Brick Co., Pittsburg, Pa.
Louisville Fire Brick Wks., Highland Park, Ky.
Niles Fire Brick Co., Niles, O.
Obermayer, S., Co., Cincinnati, O.
Ohio Fire Brick Co., Oak Hill, O.
Soisson, Jos., Fire Brick Co., Connellsville, Pa.
Stevens, F. B., Detroit, Mich.
Stowe-Fuller Co., Cleveland, O.
Swank's Sons, Hiram, Johnstown, Pa.
Union Mining Co., Mt. Savage, Md.

BRICK.
(Coke Oven.)
Ashland Fire Brick Co., Ashland, Ky.
Harbison-Walker Refractories Co., Pittsburg, Pa.
Kier Fire Brick Co., Pittsburg, Pa.
Pyro Clay Products Co., Oak Hill, O.

BRICK.
(Fire Arch.)
Pyro Clay Products Co., Oak Hill, O.

BRICK.
(Silica, Magnesia, Chrome.)
American Refractories Co., Chicago, Ill.
Harbison-Walker Refractories Co., Pittsburg, Pa.
Kier Fire Brick Co., Pittsburg, Pa.
Soisson, Jos., Fire Brick Co., Connellsville, Pa.
Stowe-Fuller Co., Cleveland, O.

BRICK.
(Stove Blast Furnace.)
Harbison-Walker Refractories Co., Pittsburg, Pa.
Kier Fire Brick Co., Pittsburg, Pa.
Union Mining Co., Mt. Savage, Md.

BRIDGES AND VIADUCTS.
(Steel.)
American Bridge Co. of New York, New York.
Lackawanna Bridge Co., Buffalo, N. Y.
McClintic-Marshall Const. Co., Pittsburg, Pa.
McMyler Interstate Co., Cleveland, O.
Worden-Allen Co., Chicago, Ill.

BRONZE.
(Vanadium.)
American Vanadium Co., Pittsburg, Pa.

BRUSHES.
(Dynamo.)
Cutler-Hammer Mfg. Co., Milwaukee, Wis.

BUCKETS.
(Clam Shell or Grab.)
McMyler Interstate Co., Cleveland, O.
Wellman-Seaver-Morgan Co., Cleveland, O.
Williams Co., G. H., Cleveland, O.

BUCKETS.
(Coal and Ore.)
Williams Co., G. H., Cleveland, O.

BUCKETS.
(Elevator and Hoisting.)
Bartlett, C. O., & Snow Co., Cleveland, O.
Brown Hoisting Machinery Co., Cleveland, O.
Illinois Malleable Iron Co., Chicago, Ill.
Jeffrey Mfg. Co., Columbus, O.
Wellman-Seaver-Morgan Co., Cleveland, O.

BULLDOZERS.
Chambersburg Engrg. Co., Chambersburg, Pa.
Cleveland Punch & Shear Wks. Co., Cleveland
Long & Allstatter Co., Hamilton, O.

BURRS.
(Rivet.)
Wrought Washer Mfg. Co., Milwaukee, Wis.

CABLEWAYS.
McClintic-Marshall Const. Co., Pittsburg, Pa.

CARS.
(Annealing, Pig Iron, Etc.)
Chase Foundry & Mfg. Co., Columbus, O.
Whiting Foundry Equipment Co., Harvey, Ill.

CARS.
(Charging.)
Industrial Car Co., West Park, O.

CARS.
(Coal, Coke and Mining.)
Industrial Car Co., West Park, O.
Jeffrey Mfg. Co., Columbus, O.
Massillon Fdy. & Machine Co., Massillon, O.
Wiener Co., Ernst, New York, N. Y.

CARS.
(Electrically Driven.)
Atlas Car & Mfg. Co., Cleveland, O.
Jeffrey Mfg. Co., Columbus, O.

CARS.
(Industrial.)
Atlas Car & Mfg. Co., Cleveland, O.
Chase Foundry & Mfg. Co., Columbus, O.
Industrial Car Co., West Park, O.
Wiener Co., Ernst, New York, N. Y.

CARS.
(Steel.)
Cambria Steel Co., Johnstown, Pa.

CASTINGS.
(Agricultural Implements.)
Benton Harbor Malleable Fdy. Co., Benton Harbor, Mich.
Frazer & Jones, Syracuse, N. Y.
National Malleable Castings Co., Cleveland, O.

CASTINGS.
(Auto.)
Benton Harbor Malleable Fdy. Co., Benton Harbor, Mich.
Chisholm & Moore Mfg. Co., Cleveland, O.
Interstate Foundry Co., Cleveland, O.
National Malleable Castings Co., Cleveland, O.

CASTINGS.
(Brass, Bronze and Aluminum.)
Dake Engine Co., Grand Haven, Mich.
Mesta Machine Co., Pittsburg, Pa.
United Engineering & Fdy. Co., Pittsburg, Pa.

CASTINGS.
(Crucible Steel.)
Adrian Steel Casting Co., Adrian, Mich.
Keystone Steel Casting Co., Chester, Pa.
Strong Steel Foundry Co., Buffalo, N. Y.
West Steel Casting Co., The, Cleveland, O.

CASTINGS.
(Die.)
Strong Steel Foundry Co., Buffalo, N. Y.

CASTINGS.
(Gray Iron.)
American Bridge Co. of New York, N. Y.
Barlow Foundry Co., Newark, N. J.
Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.
Buffalo Fdy. & Machine Co., Buffalo, N. Y.
Central Fdy. of Jackson, Jackson, Mich.
Covington Machine Co., Covington, Va.
Dake Engine Co., Grand Haven, Mich.
Erie Foundry Co., Erie, Pa.
Farrel Fdy. & Machine Co., Ansonia, Conn.
Ferguson & Lange Foundry Co., Chicago, Ill.
Flagg, Stanley G., & Co., Philadelphia, Pa.
Interstate Foundry Co., Cleveland, O.
Johnston & Jennings Co., The, Cleveland, O.
Lake Erie Engineering Works, Buffalo, N. Y.
Marshall Foundry Co., Pittsburg, Pa.
Mesta Machine Co., Pittsburg, Pa.
National Foundry Co., Erie, Pa.
National Roll & Foundry Co., Avonmore, Pa.
Pittsburg Valve, Fdy. & Const. Co., Pittsburg.
Ross-Meehan Fdy. Co., Chattanooga, Tenn.
Superior Foundry Co., Cleveland, O.
Taylor & Boggis Foundry Co., Cleveland, O.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.
Union Foundry & Machine Co., Pittsburg, Pa.
U. S. Cast Iron Pipe & Fdy. Co., New York.
Wheeling Mold & Fdy. Co., Pittsburg.
Youngstown Fdy. & Mch. Co., Youngstown, O.

CASTINGS.
(Gray Iron, Car and Locomotive.)
Buffalo Fdy. & Mach. Co., Buffalo, N. Y.
Lake Erie Engineering Works, Buffalo, N. Y.
National Foundry Co., Erie, Pa.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.
United Engineering & Fdy. Co., Pittsburg, Pa.

CASTINGS.
(Gray Iron Machinery.)
Ferguson & Lange Foundry Co., Chicago, Ill.
Interstate Foundry Co., Cleveland, O.
Superior Foundry Co., Cleveland, O.
Taylor & Boggis Foundry Co., Cleveland, O.

CASTINGS.
(Malleable.)
Acme Steel & Malleable Iron Wks., Buffalo, N. Y.
Barlow Foundry Co., Newark, N. J.
Belle City Malleable Iron Co., Racine, Wis.
Benton Harbor Malleable Fdy. Co., Benton Harbor, Mich.
Chisholm & Moore Mfg. Co., Cleveland, O.
Dayton Malleable Iron Co., Dayton, O.
Erie Malleable Iron Co., Erie, Pa.
Flagg, Stanley G., & Co., Philadelphia, Pa.
Frazer & Jones, Syracuse, N. Y.
Globe Malleable Iron & Steel Co., Syracuse, N. Y.
Illinois Malleable Iron Co., Chicago, Ill.
Lakeside Malleable Castings Co., Racine, Wis.
Missouri Malleable Iron Co., E. St. Louis, Ill.
Moline Malleable Iron Co., St. Charles, Ill.
National Malleable Castings Co., Cleveland, O.
Northwestern Mall. Iron Co., Milwaukee, Wis.
Ohio Malleable Iron Co., Columbus, O.
Pratt & Letchworth Co., Buffalo, N. Y.
Prescott Malleable Iron Co., Milwaukee, Wis.
Ross-Meehan Foundry Co., Chattanooga, Tenn.
Standard Malleable Iron Co., Muskegon, Mich.
Wisconsin Malleable Iron Co., Milwaukee, Wis.

CASTINGS.
(Malleable, Car and Locomotive.)
Dayton Malleable Iron Co., Dayton, O.
Lakeside Malleable Castings Co., Racine, Wis.
Missouri Malleable Iron Co., E. St. Louis, Mo.
National Malleable Castings Co., Cleveland, O.
Northwestern Mall. Iron Co., Milwaukee, Wis.
Pratt & Letchworth Co., Buffalo, N. Y.
Prescott Malleable Iron Co., Milwaukee, Wis.
Ross-Meehan Foundry Co., Chattanooga, Tenn.

CASTINGS.
(Manganese Steel.)
Columbia Steel Co., Portland, Ore.

CASTINGS.
(Open-Hearth Steel.)
Columbia Steel Co., Portland, Ore.

CASTINGS.
(Semi-Steel.)
Central Fdy. of Jackson, Jackson, Mich.
Lake Erie Engineering Works, Buffalo, N. Y.
Mesta Machine Co., Pittsburg, Pa.
Pittsburg Valve, Fdy. & Const. Co., Pittsburg.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.
United Engineering & Fdy. Co., Pittsburg, Pa.

CASTINGS.
(Steel.)
Acme Steel & Malleable Iron Wks., Buffalo, N. Y.
Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.
Bucyrus Steel Casting Co., Bucyrus, O.
Columbia Steel Co., Portland, Ore.
De Bats Crucible Steel Co., Zelienople, Pa.
Hubbard Steel Foundry Co., E. Chicago, Ind.
Mackintosh, Hemphill & Co., Pittsburg, Pa.
Mesta Machine Co., Pittsburg, Pa.
National Foundry Co., Erie, Pa.
Otis Steel Co., Ltd., Cleveland, O.
Pratt & Letchworth Co., Buffalo, N. Y.
Racine Steel Castings Co., Racine, Wis.
Reliance Steel Castings Co., Pittsburg, Pa.
Sharon Foundry Co., Sharon, Pa.
Smith, Geo. H., Steel Castings Co., Milwaukee.
Strong Steel Foundry Co., Buffalo, N. Y.
United Engineering & Fdy. Co., Pittsburg, Pa.
Urick Foundry Co., Erie, Pa.
West Steel Castings Co., Cleveland, O.
Wheeling Mold & Fdy. Co., Wheeling, W. Va.
Youngstown Fdy. & Mch. Co., Youngstown, O.

CASTINGS.
(Steel, Car and Locomotive.)
Bucyrus Steel Casting Co., Bucyrus, O.
Mesta Machine Co., Pittsburg, Pa.
National Foundry Co., Erie, Pa.
Otis Steel Co., Ltd., Cleveland, O.
Pratt & Letchworth Co., Buffalo, N. Y.
Strong Steel Foundry Co., Buffalo, N. Y.

CASTINGS.
(Steel Converter.)
Columbia Steel Co., Portland, Ore.
West Steel Casting Co., Cleveland, O.

CASTINGS.
(Steel Electrical.)
Smith, Geo. H., Steel Castings Co., Milwaukee.
Strong Steel Foundry Co., Buffalo, N. Y.
West Steel Casting Co., Cleveland, O.

CASTINGS.
(Stove Plate.)
Interstate Foundry Co., Cleveland, O.

CASTINGS.
(Vanadium.)
American Vanadium Co., Pittsburg, Pa.
De Bats Crucible Steel Co., Zelienople, Pa.
Mesta Machine Co., Pittsburg, Pa.
Strong Steel Foundry Co., Buffalo, N. Y.

CEMENT.
American Refractories Co., Chicago, Ill.
Universal Portland Cement Co., Chicago, Ill.

CHAINS.
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Morse Chain Co., Ithaca, N. Y.
Steel Car Forge Co., Pittsburg, Pa.

CHAIN DRIVES.
(Detachable.)
Moline Malleable Iron Co., St. Charles, Ill.

CHAIN GRATES.
Erie Foundry Co., Erie, Pa.

CHAPLETS.
Champion Machine & Forging Co., Cleveland, O.
Cheney & Son, S., Manlius, N. Y.

CHARCOAL.
Hillman, J. H., & Son, Pittsburg, Pa.

CHEMICALS.
(General.)
General Chemical Co., Cleveland, O.

CHEMISTS.
(Analytical.)
Dover Laboratory, Dover, N. J.

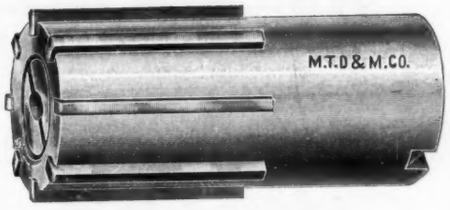
CHIMNEYS.
Kennicott Co., Chicago, Ill.

CLAMPS.
Starrett, L. S., Co., Athol, Mass.

CLAY.
(Fire Ground.)
Harbison-Walker Refractories Co., Pittsburg, Pa.
Pyro Clay Products Co., Oak Hill, O.
Robertson & Son, New Brighton, Pa.
Union Mining Co., Mt. Savage, Md.

CLUTCHES.
Brown Hoisting Machinery Co., Cleveland, O.

"MORSE"



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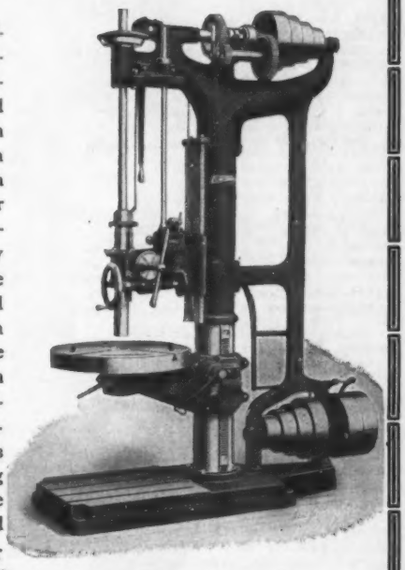
Speed + Power

They are scientifically correct in design and construction. Accurate and profitable—come in every combination —20 to 42 inch swing — sliding or stationary head — high speed or heavy patterns — have powerfully geared spindles and extra driving belts; are equipped with instantaneous spindle stop for changing chuck or drills without stopping the machine; have our patent geared tapping attachment directly on the spindle, which stops it without using belt shifter, etc.



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Heavy Pattern, Sliding Head, Upright Drill, with Friction Back Gears, 24", 28" 32", 36" and 42"

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Radial Drill

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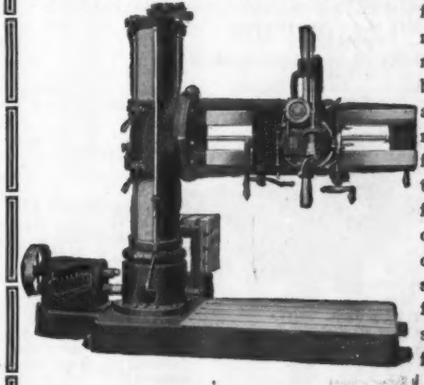

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Full Universal Radial Drill

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Oakley, Cincinnati, Ohio, U.S.A.

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CLUTCHES.
(Magnetic.)
Cutler-Hammer Clutch Co., Milwaukee, Wis.

COAL AND COKE.
Addy, Matthew, & Co., Cincinnati, O.
Baird & West, Detroit, Mich.
Banning, Cooper & Co., Ltd., Pittsburg, Pa.
Bessemer Coke Co., Pittsburg, Pa.
Bourne-Fuller Co., Cleveland, O.
Columbus Iron & Steel Co., Columbus, O.
Depevoise-Anderson Co., New York City.
DeCamp Bros. & Yule Iron, Coal & Coke Co., St. Louis, Mo.
Eaton, Rhodes & Co., Cincinnati, O.
Hanna, M. A., & Co., Cleveland, O.
Hickman, Williams & Co., Chicago, Ill.
Huiman, J. H., & Son, Pittsburg, Pa.
Laiielle Iron Works Co., Steubenville, O.
McKeefrey & Co., Leetonia, O.
Mohr, J. J., & Son, Philadelphia, Pa.
Pittsburg-Westmoreland Coal Co., Pittsburg, Pa.
Rogers, Brown & Co., Cincinnati, O.

COILS.
(Pipe.)
National Tube Co., Pittsburg, Pa.
Pittsburg Valve, Fdy. & Const. Co., Pittsburg.
Samuel, Frank, Philadelphia, Pa.
Snyder & Co., W. P., Pittsburg, Pa.
Stewart Iron Co., Ltd., Cleveland, O.
Tennessee Coal, Iron & R.R. Co., B'rm'g'm, Ala.
Walter-Wallingford & Co., Cincinnati, O.
Washington Coal & Coke Co., Pittsburg, Pa.

COKE PUSHERS.
Koppers, H., Joliet, Ill.

COMPOUND.
(Core.)
Obermayer, S., Co., Cincinnati, O.

COMPRESSORS.
(Air.)
American Compressor & Pump Co., Baltimore.
Baird Machinery Co., Pittsburg, Pa.
Cameron Steam Pump Wks., New York.
Dean Bros. Steam-Pump Wks., Indianapolis, Ind.
Deming Co., Salem, O.
General Electric Co., Schenectady, N. Y.
Ingersoll-Rand Co., New York.
McGowan, J. H., Cincinnati, O.
Mesta Machine Co., Pittsburg, Pa.
Norwalk Iron Works Co., So. Norwalk, Conn.

COMPRESSORS.
(Gas.)
Ingersoll-Rand Co., New York.
Norwalk Iron Works Co., So. Norwalk, Conn.

CONDENSERS.
(Steam.)
Cameron Steam Pump Works, New York.
Cooper, C. & G., Co., Mt. Vernon, O.
Dean Bros. Steam Pump Wks., Indianapolis.
Eynon-Evans Mfg. Co., Philadelphia, Pa.
McGowan, J. H., Co., Cincinnati, O.
Mesta Machine Co., Pittsburg, Pa.
Prescott Steam Pump Co., Milwaukee, Wis.

CONSTRUCTION.
(By-Products Coke Ovens.)
Koppers, H., Joliet, Ill.

CONSTRUCTION.
(Concrete.)
Kratzer, W. N., & Co., Pittsburg, Pa.

CONSTRUCTION.
(Steel and Iron.)
American Bridge Co. of New York, N. Y.
Bellefontaine Bridge & Steel Co., Bellefontaine, O.
Freeman, S., & Sons Mfg. Co., Racine, Wis.
Kratzer, W. N., & Co., Pittsburg, Pa.
McAllister-Byrne Construction Co., Girard, O.
McMyler Interstate Co., Cleveland, O.
Meehan Boiler & Const. Co., Lowellville, O.
Riter-Conley Mfg. Co., Pittsburg, Pa.
Sharon Boiler Works, Sharon, Pa.

CONTRACTORS.
(Piping.)
Pittsburg Piping & Equipment Co., Pittsburg.
Pittsburg Valve, Fdy. & Const. Co., Pittsburg.

CONTROLLERS.
Allen, John F., Co., New York City.
Alliance Machine Co., Alliance, O.
Cutler-Hammer Mfg. Co., Milwaukee, Wis.
Electric Controller & Mfg. Co., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Westinghouse Elec. & Mfg. Co., Pittsburg, Pa.

CONTROLLERS.
(Boiler Feed and Open Heater Feed.)
Strong, Carlisle & Hammond Co., Cleveland, O.

CONTROLLERS.
(Crane.)
Cutler-Hammer Mfg. Co., Milwaukee, Wis.
Electric Controller & Mfg. Co., Cleveland, O.
Westinghouse Electric & Mfg. Co., Pittsburg.

CONTROLLERS.
(Electric.)
Cutler-Hammer Mfg. Co., Milwaukee, Wis.
Electric Controller & Mfg. Co., Cleveland, O.
Westinghouse Electric & Mfg. Co., Pittsburg.

CONVERTERS.
(Steel Mill.)
Whiting Foundry Equipment Co., Harvey, Ill.

CONVEYORS.
Bartlett, C. O., & Snow Co., Cleveland, O.
Jeffrey Mfg. Co., Columbus, O.
McMyler Interstate Co., Cleveland, O.

COUNTER SHAFTS.
(Variable Speed.)
Norton Co., Worcester, Mass.

COUPLINGS.
Bradley, C. C. & Son, Syracuse, N. Y.
Jones & Laughlin Steel Co., Pittsburg, Pa.
National Tube Co., Pittsburg, Pa.

COUPLINGS.
(Flexible.)
Electric Controller & Mfg. Co., Cleveland, O.

CRANES.
(Charging.)
Alliance Machine Co., Alliance, O.
Cleveland Crane & Engrg. Co., Wickliffe, O.
Morgan Engineering Co., Alliance, O.
Pawling & Harnischfeger Co., Milwaukee, Wis.
Toledo Bridge & Crane Co., Toledo, O.

CRANES.
(Electric Traveling.)
Alliance Machine Co., Alliance, O.
Brown Hoisting Machinery Co., Cleveland, O.
Browning, Victor R., Co., Cleveland, O.
Chisholm & Moore Mfg. Co., Cleveland, O.
Cleveland Crane & Engrg. Co., Wickliffe, O.
Industrial Works, Bay City, Mich.
Mackintosh, Hemphill & Co., Pittsburg, Pa.
Manning, Maxwell & Moore, New York City.
McMyler Interstate Co., Cleveland, O.
Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., New York, N. Y.
Northern Engineering Works, Detroit, Mich.
Pawling & Harnischfeger Co., Milwaukee, Wis.
Ridgway, Craig & Son, Coatesville, Pa.
Shaw Electric Crane Co., New York, N. Y.
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.
Toledo Bridge & Crane Co., Toledo, O.
Wellman-Seaver-Morgan Co., Cleveland, O.
Whiting Foundry Equipment Co., Harvey, Ill.
Wood, R. D., & Co., Philadelphia, Pa.

CRANES.
(Gantry.)
Alliance Machine Co., Alliance, O.
Brown Hoisting Machinery Co., Cleveland, O.
Cleveland Crane & Engrg. Co., Wickliffe, O.
McMyler Interstate Co., Cleveland, O.
Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., New York, N. Y.
Northern Engineering Works, Detroit, Mich.
Pawling & Harnischfeger Co., Milwaukee, Wis.
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.
Toledo Bridge & Crane Co., Toledo, O.

CRANES.
(Grab Bucket.)
Cleveland Crane & Engrg. Co., Wickliffe, O.
Northern Engineering Works, Detroit, Mich.
Pawling & Harnischfeger Co., Milwaukee, Wis.

CRANES.
(Hand Traveling.)
Alliance Machine Co., Alliance, O.
Brown Hoisting Machinery Co., Cleveland, O.
Browning, Victor R., Co., Cleveland, O.
Chisholm & Moore Mfg. Co., Cleveland, O.
Cleveland Crane & Engrg. Co., Wickliffe, O.
Euclid Crane & Hoist Co., Euclid, O.
Niles-Bement-Pond Co., New York, N. Y.
Northern Engineering Works, Detroit, Mich.
Toledo Bridge & Crane Co., Toledo, O.
Whiting Foundry Equipment Co., Harvey, Ill.

CRANES.
(Hydraulic.)
Alliance Machine Co., Alliance, O.
Morgan Engineering Co., Alliance, O.
Toledo Bridge & Crane Co., Toledo, O.

CRANES.
(Ingot Stripper.)
Pawling & Harnischfeger Co., Milwaukee, Wis.

CRANES.
(Jib.)
Alliance Machine Co., Alliance, O.
Brown Hoising Machinery Co., Cleveland, O.
Cleveland Crane & Engrg. Co., Wickliffe, O.
Chisholm & Moore Mfg. Co., Cleveland, O.
Euclid Crane & Hoist Co., Euclid, O.
Industrial Works, Bay City, Mich.
McMyler Interstate Co., Cleveland, O.
Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., New York, N. Y.
Northern Engineering Works, Detroit, Mich.
Pawling & Harnischfeger Co., Milwaukee, Wis.
Ridgway, Craig & Son, Coatesville, Pa.
Toledo Bridge & Crane Co., Toledo, O.
United Engrg. & Fdy. Co., Pittsburg, Pa.
Whiting Foundry Equipment Co., Harvey, Ill.

CRANES.
(Locomotive.)
Brown Hoisting Machinery Co., Cleveland, O.
Cleveland Crane & Engrg. Co., Wickliffe, O.
Industrial Works, Bay City, Mich.
McMyler Interstate Co., Cleveland, O.
Morgan Engineering Co., Alliance, O.
Northern Engineering Works, Detroit, Mich.
Wellman-Seaver-Morgan Co., Cleveland, O.

CRANES.
(Pneumatic.)
Brown Hoisting Machinery Co., Cleveland, O.
Detroit Hoist & Mach. Co., Detroit, Mich.
Industrial Works, Bay City, Mich.
Northern Engineering Works, Detroit, Mich.
Toledo Bridge & Crane Co., Toledo, O.
Whiting Foundry Equipment Co., Harvey, Ill.

CRANES.
(Special.)
Alliance Machine Co., Alliance, O.
Cleveland Crane & Engrg. Co., Wickliffe, O.
Morgan Engrg. Co., Alliance, O.
Niles-Bement-Pond Co., New York, N. Y.
Northern Engineering Works, Detroit, Mich.
Shaw Electric Crane Co., New York, N. Y.
Toledo Bridge & Crane Co., Toledo, O.
United Engineering & Fdy. Co., Pittsburg, Pa.

CRANES.
(Steam and Pneumatic, Wire Mills.)
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

CRAYONS.
(Metal Marking.)
Korn, Wm., 120-R Centre St., New York City.

CRUCIBLES.
Dixon, Joseph, Crucible Co., Jersey City, N. J.

CUPOLAS.
Northern Engineering Works, Detroit, Mich.
Obermayer, S., Co., Cincinnati, O.
Riter-Conley Mfg. Co., Pittsburg, Pa.
Whiting Foundry Equipment Co., Harvey, Ill.

CUPRO.
(Vanadium.)
American Vanadium Co., Pittsburg.

CUTTERS.
Landis Tool Co., Waynesboro, Pa.

CUTTERS.
(Coal.)
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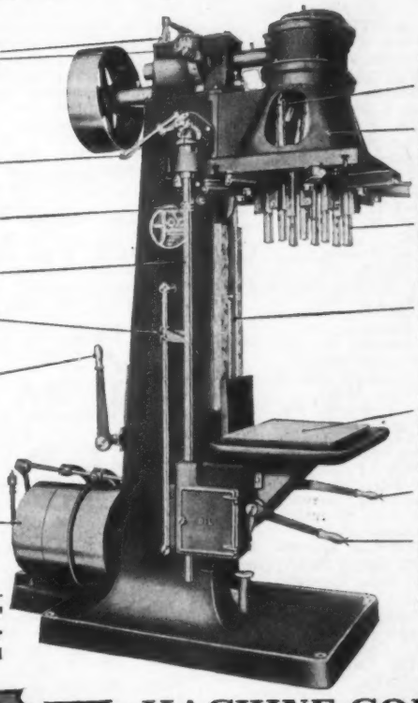
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GRINDERS.
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Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

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Cleveland Pneumatic Tool Co., Cleveland, O.

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(Belt Driven.)
Bradley & Son, C. C., Syracuse, N. Y.

HAMMERS.
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Alliance Machine Co., Alliance, O.
Bliss, E. W., Co., Brooklyn, N. Y.
Chambersburg Engrg. Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Garrison, A., Foundry Co., Pittsburg, Pa.
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Merrill Bros., Brooklyn, N. Y.
Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., New York City.
Toledo Machine & Tool Co., Toledo, O.
United Engrg. & Fdy. Co., Pittsburg, Pa.
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Erie Foundry Co., Erie, Pa.
Massillon Fdy. & Mach. Co., Massillon, O.
Mesta Machine Co., Pittsburg, Pa.
Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., New York City.

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Hawley Down-Draft Furnace Co., Chicago, Ill.

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Detroit Hoist & Mch. Co., Detroit, Mich.

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Ingersoll-Rand Co., New York.

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Brown Hoisting Machinery Co., Cleveland, O.
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Cleveland Crane & Engrg. Co., Wickliffe, O.
Euclid Crane & Hoist Co., Euclid, O.
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Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., New York City.
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Dake Engine Co., Grand Haven, Mich.
Detroit Hoist & Machine Co., Detroit, Mich.
Northern Engineering Works, Detroit, Mich.
Ridgway, Craig, & Son, Coatesville, Pa.
Whiting Foundry Equipment Co., Harvey, Ill.

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(Steel.)
American Steel & Wire Co., Chicago, Ill.
Amer. Tube & Stamping Co., Bridgeport, Ct.
Bourne-Fuller Co., Cleveland, O.
Carnegie Steel Co., Pittsburg, Pa.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Pittsburg Steel Co., Pittsburg, Pa.

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(Pneumatic.)
Cleveland Pneumatic Tool Co., Cleveland, O.

HYDROGEN.
American Oxhydric Co., The, Milwaukee, Wis.

INDICATORS.
(Revolution.)
Brown Instrument Co., Philadelphia, Pa.

INJECTORS.
Watson, N. A., Erie, Pa.

INSTRUMENTS.
(Electrical.)
Bristol Co., Waterbury, Conn.
Brown Instrument Co., Philadelphia, Pa.

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Pittsburg Metal Products Co., Pittsburg, Pa. "Am. Ingot Iron."

IRON.
(Autogenous Welding.)
American Oxhydric Co., The, Milwaukee, Wis.

IRON.
(Basic—Bessemer—Malleable.)
Addy, Matthew, & Co., Cincinnati, O.

IRON.
(Cutting Apparatus.)
American Oxhydric Co., The, Milwaukee, Wis.
Newton Mach. Tool Wks., Inc., Philadelphia, Pa.

IRON.
(Forging.)
Bourne-Fuller Co., Cleveland, O.

IRON.
(Pig.)
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Eaton, Rhodes & Co., Cincinnati, O.
Globe Iron Co., Jackson, O.
Hanna & Co., M. A., Cleveland, O.
Hickman, Williams & Co., Chicago, Ill.
Hillman & Son, J. H., Pittsburg, Pa.
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Lea, & Co., J. Tatnall, Philadelphia, Pa.
McKeefrey & Co., Leetonia, O.
Mitchell-Diggins Iron Co., Cadillac, Mich.
Mohr, J. J., & Son, Philadelphia, Pa.
Perry Iron Co., Erie, Pa.
Pickands, Brown & Co., Chicago, Ill.
Pickands, Mather & Co., Cleveland, O.
Republic Iron & Steel Co., Pittsburg, Pa.
Rogers, Brown & Co., Cincinnati, O.
Samuel, Frank, Philadelphia, Pa.
Snyder Co., W. P., Pittsburg, Pa.
Stewart Iron Co., Ltd., Cleveland, O.
Superior Charcoal Iron Co., Grand Rapids, Mich.
Tennessee Coal, Iron & R. R. Co., B'm'g'm, Ala.
Thomas Furnace Co., Milwaukee, Wis.
Upson Nut Co., Cleveland, O.
Walter-Wallingford & Co., Cincinnati, O.

IRON.
(Staybolt.)
Bourne-Fuller Co., Cleveland, O.

IRON AND STEEL.
McCalla, Harold, Philadelphia, Pa.

IRON AND STEEL.
(Galvanized.)
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Pittsburg, Pa.
Bourne-Fuller Co., Cleveland, O.
Empire Iron & Steel Co., Niles, O.
Inland Steel Co., Chicago, Ill.
McCalla, Harold, Philadelphia, Pa.
Newport Rolling Mill Co., Newport, Ky.
Ryerson, Jos. T., & Son, Chicago, Ill.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.
Wood & Co., Alan, Philadelphia, Pa.
Youngstown Sheet & Tube Co., Youngstown, O.

IRON AND STEEL.
(Scrap.)
American Bridge Co. of New York, New York.
Bourne-Fuller Co., Cleveland, O.
Richardson & Co., Pittsburg, Pa.

JOINTS.
(Rail.)
Carnegie Steel Co., Pittsburg, Pa.
Chisholm & Moore Co., Cleveland, O.
Lackawanna Steel Co., New York City.

KETTLES AND POTS.
(Galvanizing.)
Kennicott Co., Chicago, Ill.
Wilfong Iron Works Co., M. F., Philadelphia.

KEYS AND COTTERS.
(Machine.)
Standard Gauge Steel Co., Beaver Falls, Pa.

KEYSEATERS.
Baker Bros., Toledo, O.
Mitts & Merrill, Saginaw, Mich.

LADLES.
Industrial Car Co., West Park, O.
Kennicott Co., Chicago, Ill.
Northern Engineering Wks., Detroit, Mich.
Riter-Conley Mfg. Co., Pittsburg, Pa.
Treadwell Construction Co., Midland, Pa.
Whiting Fdy. & Equipment Co., Harvey, Ill

LAMPS.
Obermayer, S., Co., Cincinnati, O.

LAMPS.
(Arc.)
Adams-Bagnall Electric Co., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Westinghouse Elec. & Mfg. Co., Pittsburg, Pa.

LAMPS.
(Electric.)
Adams-Bagnall Electric Co., Cleveland, O.

LAMPS.
(Incandescent.)
General Electric Co., Schenectady, N. Y.
Westinghouse Elec. & Mfg. Co., Pittsburg, Pa.

LATH.
(Expanded.)
American Rolling Mill Co., Middletown, O.
Youngstown Iron & Steel Co., Youngstown, O.

LATH.
(Metal.)
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Pittsburg, Pa.

LATHES.
American Tool & Machine Co., Boston, Mass.
Baird Machinery Co., Pittsburg, Pa.
Cincinnati Bickford Tool Co., Cincinnati, O.
Cincinnati Iron & Steel Co., Cincinnati, O.
Fox Machine Co., Grand Rapids, Mich.
Jones & Lamson Mach. Co., Springfield, Vt.
Le Blond Mach. Tool Co., R. K., Cincinnati.
Lodge & Shipley Mach. Tool Co., Cincinnati.
Manning, Maxwell & Moore, Inc., New York.
McCabe, J. J., New York City.
Motch & Merryweather Mach. Co., Cleveland.
Niles-Bement-Pond Co., New York City.
Schumacher & Boye, Cincinnati, O.

WHERE TO BUY

LEATHER.
(Lace.)
Chicago Rawhide Mfg. Co., Chicago, Ill.

LINE MATERIAL.
(Telegraph and Telephone.)
Inland Steel Co., Chicago, Ill.
National Tube Co., Pittsburg, Pa.

LININGS.
(Brake.)
Erbestos Brake Lining Co., Philadelphia, Pa.

LININGS.
(Cupola.)
Harbison-Walker Refractories Co., Pittsburg, Pa.
Louisville Fire Brick Wks., Highland Park, Ky.
Stevens, Frederic B., Detroit, Mich.

LININGS.
(Forge and Furnace.)
Ashland Fire Brick Co., Ashland, Ky.
Harbison-Walker Refractories Co., Pittsburg, Pa.
Pyro Clay Products Co., Oak Hill, O.

LININGS.
(Friction Clutch.)
Erbestos Brake Lining Co., Philadelphia, Pa.

LININGS.
(Ladle.)
Harbison-Walker Refractories Co., Pittsburg, Pa.
Pyro Clay Products Co., Oak Hill, O.

LOCKS.
York Safe & Lock Co.

LOCOMOTIVES.
(Electric.)
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., Pittsburg.

LOCOMOTIVES.
(Industrial.)
American Locomotive Co., New York, N. Y.
Vulcan Iron Works, Wilkesbarre, Pa.

LUMBER.
(Boxing, Crating, Flask and Pattern.)
Johnson Lumber Co., Milwaukee, Wis.

MACHINE WORK.
(Heavy.)
Schaeffer Machine Wks., Philadelphia, Pa.

MACHINERY.
American Stoker Co., New York, N. Y.

MACHINERY.
(Automatic Gear Cutting.)
Motch & Merryweather Machy. Co., Cleveland.
Newton Mach. Tool Wks., Inc., Philadelphia, Pa.

MACHINERY.
(Barb Wire Fence, Barb Nail Wire, Wire Mills.)
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

MACHINERY.
(Bending and Straightening.)
Bertsch & Co., Cambridge City, Ind.
Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.
Bliss Co., E. W., Brooklyn, N. Y.
Cleveland Punch & Shear Wks. Co., Cleveland.
Covington Machine Co., Covington, Va.
Dreis & Krump Mfg. Co., Chicago, Ill.
Espen-Lucas Works, Philadelphia, Pa.
Long & Allstatter Co., Hamilton, O.
Mesta Machine Co., Pittsburg, Pa.
Morgan Engineering Co., Alliance, O.
Toledo Machine & Tool Co., Toledo, O.
United Engrg. & Fdy. Co., Pittsburg, Pa.
Watson-Stillman Co., New York, N. Y.
Wheeling Mold & Fdy. Co., Wheeling, W. Va.
Wire Specialty Works, South Bend, Ind.
Youngstown Fdy. & Mchy. Co., Youngstown, O.

MACHINERY.
(Blue Printing.)
Buckeye Engine Co., Salem, O.

MACHINERY.
(Boilermakers'.)
Scully Steel & Iron Co., Chicago, Ill.

MACHINERY.
(Bolt and Nut.)
Baird Machinery Co., Pittsburg, Pa.
National Mach. Co., Tiffin, O.
Newton Mach. Tool Wks., Inc., Philadelphia, Pa.
Williams Tool Co., Erie, Pa.

MACHINERY.
(Boring and Turning.)
Baker Bros., Toledo, O.
Cincinnati Bickford Tool Co., Cincinnati, O.
Espen-Lucas Mach. Works, Philadelphia, Pa.
McCabe, J. J., New York City.
Mitts & Merrill, Saginaw, Mich.
Motch & Merryweather Machy. Co., Cleveland.
Newton Mach. Tool Wks., Inc., Philadelphia, Pa.
Niles-Bement-Pond Co., New York City.
Warner & Swasey Co., Cleveland, O.

MACHINERY.
(Buckle Tongue.)
Adt & Son, John, New Haven, Conn.

MACHINERY.
(Butt Drilling and Milling.)
Adt & Son, John, New Haven, Conn.

MACHINERY.
(By-Products Coke Oven.)
Koppers, H., Joliet, Ill.

MACHINERY.
(Cement.)
Vulcan Iron Works, Wilkesbarre, Pa.

MACHINERY.
(Centrifugal.)
Koppers, H., Joliet, Ill.

MACHINERY.
(Coil and Trace Chain, Welded Chain Factories.)
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

MACHINERY.
(Coke Ovens.)
Koppers, H., Joliet, Ill.

MACHINERY.
(Coping.)
Newton Mach. Tool Wks., Inc., Philadelphia, Pa.

MACHINERY.
(Corrugating.)
Erie Foundry Co., Erie, Pa.

MACHINERY.
(Cotter Pin.)
Shuster Co., F. B., New Haven, Conn.

MACHINERY.
(Crushing.)
Bartlett & Snow Co., C. O., Cleveland, O.
Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.

MACHINERY.
(Cutting Off—Cold Metal.)
Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.
Cleveland Punch & Shear Wks. Co., Cleveland.
Espen-Lucas Mach. Works, Philadelphia, Pa.
Newton Mach. Tool Wks., Inc., Philadelphia, Pa.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

MACHINERY.
(Drilling.)
Baird Machinery Co., Pittsburg, Pa.
Baker Bros., Toledo, O.
Baush Machine Tool Co., Springfield, Mass.
Cincinnati Bickford Tool Co., Cincinnati, O.
Fox Machine Co., Grand Rapids, Mich.
Manning, Maxwell & Moore, Inc., New York.
Massillon Fdy. & Mach. Co., Massillon, O.
McCabe, J. J., New York City.
Motch & Merryweather Mchy. Co., Cleveland.
Newton Mach. Tool Wks., Inc., Philadelphia, Pa.
Niles-Bement-Pond Co., New York City.
Townsend, H. P., Mfg. Co., Hartford, Conn.

MACHINERY.
(Drilling and Boring, Horizontal.)
Newton Mach. Tool Wks., Inc., Philadelphia, Pa.
Pawling & Harnischfeger Co., Milwaukee, Wis.

MACHINERY.
(Drilling, Multiple.)
Baush Machine Tool Wks., Inc., Phila., Pa.
Fox Machine Co., Grand Rapids, Mich.
Newton Mach. Tool Wks., Inc., Philadelphia, Pa.

MACHINERY.
(Drilling, Sensitive and Upright.)
Fox Machine Co., Grand Rapids, Mich
Townsend, H. P., Mfg. Co., Hartford, Conn.

MACHINERY.
(Drilling, Radial.)
Baush Machine Tool Wks., Inc., Phila, Pa.
Newton Mach. Tool Wks., Inc., Philadelphia, Pa.

MACHINERY.
(Electric Welding.)
Toledo Electric Welder Co., The, Cincinnati.

MACHINERY.
(Elevating and Conveying.)
Bartlett & Snow Co., C. O., Cleveland, O.
Brown Hoisting Machinery Co., Cleveland, O.
Jeffrey Mfg. Co., Columbus, O.
McMyler Interstate Co., Cleveland, O.
Vulcan Iron Works, Wilkesbarre, Pa.
Wellman-Seaver-Morgan Co., Cleveland, O.

MACHINERY.
(Forging.)
Bliss Co., E. W., Brooklyn, N. Y.
Merrill Bros. Brooklyn, N. Y.
Morgan Engineering Co., Alliance, O.
Tod Co., Wm., Youngstown, O.
Toledo Machine & Tool Co., Toledo, O.
United Engrg. & Fdy. Co., Pittsburg, Pa.

MACHINERY.
(Galvanizing.)
Erie Foundry Co., Erie, Pa.

MACHINERY.
(Gear Cutting.)
Cincinnati Gear Cutting Mach. Co., Cincinnati.
Cincinnati Shaper Co., Cincinnati, O.
Gleason Works, Rochester, N. Y.
Newton Mach. Tool Wks., Inc., Philadelphia, Pa.
Ward & Sons, Edgar T., Boston, Mass.

MACHINERY.
(Grinding.)
Landis Tool Co., Waynesboro, Pa.
Motch & Merryweather Machy. Co., Cleveland.
Newton Mach. Tool Wks., Inc., Philadelphia, Pa.

MACHINERY.
(Hydraulic.)
Chambersburg Engrg. Co., Chambersburg, Pa.
Mesta Machine Co., Pittsburg, Pa.
Tod Co., Wm., Youngstown, O.
United Engrg. & Fdy. Co., Pittsburg, Pa.

MACHINERY.
(Milling.)
Cincinnati Milling Mach. Co., Cincinnati, O.
Espen-Lucas Mach. Works, Philadelphia, Pa.
Foote Bros. Gear & Mach. Co., Chicago, Ill.
Fox Machine Co., Grand Rapids, Mich.
LeBlond Mach. Tool Co., R. K., Cincinnati, O.
McCabe, J. J., New York City.
Motch & Merryweather Mach. Co., Cleveland.
Newton Mach. Tool Wks., Inc., Philadelphia, Pa.
Niles-Bement-Pond Co., New York City.
Warner & Swasey Co., Cleveland, O.

MACHINERY.
(Mining.)
Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.
Lake Erie Engineering Wks., Buffalo, N. Y.
McMyler Interstate Co., Cleveland, O.
Prescott Steam Pump Wks., Milwaukee, Wis.
Thew Automatic Shovel Co., Lorain, O.
Union Fdy. & Mach. Co., Pittsburg, Pa.
Wellman-Seaver-Morgan Co., Cleveland, O.

MACHINERY.
(Molding.)
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

MACHINERY.
(Nut Facing.)
Newton Mach. Tool Wks., Inc., Philadelphia, Pa.

MACHINERY.
(Pipe Mill.)
Fox Machine Co., Grand Rapids, Mich.
Standard Engineering Co., Ellwood City, Pa.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.
Wheeling Mold & Fdy. Co., Wheeling, W. Va.
Williams Tool Co., Erie, Pa.

MACHINERY.
(Planing.)
Newton Mach. Tool Wks., Inc., Philadelphia, Pa.

MACHINERY.
(Plate Bending.)
Dreis & Krump Mfg. Co., Chicago, Ill.

MACHINERY.
(Rolling Mill.)
Alliance Machine Co., Alliance, O.
Bertsch & Co., Cambridge City, Ind.
Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.
Bucyrus Steel Casting Co., Bucyrus, O.
Farrel Foundry & Mch. Co., Ansonia, Conn.
Garrison, A., Foundry Co., Pittsburg, Pa.
Hyde Park Fdy. & Mch. Co., Hyde Park, Pa.
Johnston & Jennings Co., Cleveland, O.
Lake Erie Engineering Works, Buffalo, N. Y.
Mackintosh, Hemphill & Co., Pittsburg, Pa.
Mesta Machine Co., Pittsburg, Pa.
Morgan Construction Co., Worcester, Mass.
Morgan Engineering Co., Alliance, O.
Newbold, R. S., & Son Co., Norristown, Pa.
Standard Engineering Co., Ellwood City, Pa.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.
Tod Co., Wm., Youngstown, O.
Union Fdy. & Mach. Co., Pittsburg, Pa.
United Engrg. & Fdy. Co., Pittsburg, Pa.
Waterbury Farrel Fdy. & Mch. Co., Wat'bry, Ct.
Wellman-Seaver-Morgan Co., Cleveland, O.
Wheeling Mold & Fdy. Co., Pittsburg, Pa.
Youngstown Fdy. & Mch. Co., Youngstown, O.

MACHINERY.
(Screw, Automatic.)
Cook Co., The Asa S., Hartford, Conn.
National Acme Mfg. Co., Cleveland, O.
National Sewing Machine Co., Belvidere, Ill.

MACHINERY.
(Second Hand.)
Baird Machinery Co., Pittsburg, Pa.
Casey, D. L., Mach. Co., Springfield, O.
Cincinnati Machinery Co., Cincinnati, O.
Cleveland Belting & Mach. Co., Cleveland, O.
Dorner Railway Equipment Co., Chicago, Ill.
Essley, E. L. Mach. Co., The, Chicago, Ill.
Lodge & Shipley Mch. Tool Co., Cincinnati, O.
McCabe, J. J., New York City.
McDowell & Co., N. S., Pittsburg, Pa.
Motch & Merryweather Mch. Co., Cleveland, O.
Niles-Bement-Pond Co., New York City.
Perkins Jr., W. L., & Co., New York.
Ryerson, Jos. T., & Son, Chicago, Ill.
Toomey, Frank, Philadelphia, Pa.
Topper Bros., Columbus, O.
Wilson, F. N., Chicago, Ill.

MACHINERY.
(Sheet Metal Working.)
Dreis & Krump Mfg. Co., Chicago, Ill.

MACHINERY.
(Shovel.)
Toledo Machine & Tool Co., Toledo, O.
Union Foundry & Mach. Co., Pittsburg, Pa.

MACHINERY.
(Special.)
Alliance Machine Co., Alliance, O.
Bilgram Machine Wks., Philadelphia, Pa.
Bucyrus Steel Casting Co., Bucyrus, O.
Dreis & Krump Mfg. Co., Chicago, Ill.
Foote Bros. Gear & Machine Co., Chicago, Ill.
Franklin Mfg. Co., New Haven, Conn.
Johnston & Jennings Co., Cleveland, O.
Kilby Mfg. Co., Cleveland, O.
Long & Allstatter Co., Hamilton, O.
Manning, Maxwell & Moore, Inc., New York.
Merrill Bros., Brooklyn, N. Y.
Mesta Machine Co., Pittsburg, Pa.
Schaeffer Machine Wks., Philadelphia, Pa.
Shuster Co., F. B., New Haven, Conn.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.
Tod Co., Wm., Youngstown, O.
Union Fdy. & Mach. Co., Pittsburg, Pa.
Wheeling Mold & Fdy. Co., Wheeling, W. Va.
Wire Specialty Works, South Bend, Ind.

WHERE TO BUY

MACHINERY.
(Spike and Nail.)
National Machinery Co., Tiffin, O.

MACHINERY.
(Staple.)
Adt & Son, John, New Haven, Conn.

MACHINERY.
(Tapping.)
Baker Bros., Toledo, O.
Cincinnati Bickford Tool Co., Cincinnati, O.

MACHINERY.
(Tin House.)
Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.
Mesta Machine Co., Pittsburg, Pa.
Union Foundry & Machine Co., Pittsburg, Pa.
United Engineering & Fdy. Co., Pittsburg, Pa.
Wheeling Mold & Fdy. Co., Pittsburg, Pa.

MACHINERY.
(Wire Drawing, Wire and Rivet Works.)
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

MACHINERY.
(Wire.)
Shuster Co., F. B., New Haven, Conn.
Wire Specialty Works, South Bend, Ind.

MACHINERY.
(Wire Forming.)
Wire Specialty Works, South Bend, Ind.

MACHINERY.
(Wire Galvanizing, Wire Tinning, Wire Nails.)
Morgan Construction Co., Worcester, Mass.
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

MACHINERY.
(Wire Nails and Staples, Wire Nail Mills.)
Kilby Mfg. Co., Cleveland, O.
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

MACHINERY.
(Wood Working.)
Fox Machine Co., Grand Rapids, Mich.

MAGNESITE.
American Refractories Co., Chicago, Ill.
Harbison-Walker Refractories Co., Pittsburg, Pa.

MAGNESITE.
(Dead Burned.)
American Refractories Co., Chicago, Ill.
Harbison-Walker Refractories Co., Pittsburg, Pa.
Stowe-Fuller Co., Cleveland, O.

MAGNETS.
(Lifting.)
Cutler-Hammer Clutch Co., Milwaukee, Wis.
Electric Controller & Mfg. Co., Cleveland, O.

MANGANESE.
Hickman, Williams & Co., Chicago, Ill.

METAL.
(Expanded.)
Youngstown Iron & Steel Co., Youngstown, O.

METALS.
(Antimony, Copper.)
Blackwell, Sons & Co., Ltd., Liverpool, Eng.

METALS.
(Autogenous Welding.)
American Oxhydric Co., The, Milwaukee, Wis.

METALS.
(Cutting Apparatus.)
American Oxhydric Co., The, Milwaukee, Wis.

MILLS.
(Billets.)
Morgan Construction Co., Worcester, Mass.

MILLS.
(Continuous Rolling.)
Morgan Construction Co., Worcester, Mass.

MILLS.
(Wire Complete Equipment.)
Morgan Construction Co., Worcester, Mass.
Waterbury Farrel Fdy. & Mch. Co., Wat'bry, Ct.

MODELS.
(Made to Order.)
Standard Pattern Works Co., Cleveland, O.

MOLDS.
(Ingot.)
Carnegie Steel Co., Pittsburg, Pa.
Interstate Foundry Co., Cleveland, O.
Marshall Foundry Co., Pittsburg, Pa.
Union Foundry Co., Pittsburg, Pa.
Wheeling Mold & Fdy. Co., Wheeling, W. Va.
Youngstown Fdy. & Mch. Co., Youngstown, O.

MOTORS.
(Air.)
Chisholm & Moore Mfg. Co., Cleveland, O.
Dake Engine Co., Grand Haven, Mich.
Detroit Hoist & Machine Co., Detroit, Mich.
Westinghouse Elec. & Mfg. Co., Pittsburg, Pa.

MOTORS.
(Electric D. C. and A. C.)
Crocker-Wheeler Co., Ampere, N. J.
General Electric Co., Schenectady, N. Y.
Holt Electric Co., Milwaukee, Wis.
Westinghouse Elec. & Mfg. Co., Pittsburg, Pa.

MOTORS.
(Mill.)
Crocker-Wheeler Co., Ampere, N. J.
Holt Electric Co., Milwaukee, Wis.
Westinghouse Electric & Mfg. Co., Pittsburg.

NAILS.
American Steel & Wire Co., Chicago, Ill.
Jones & Laughlin Steel Co., Pittsburg, Pa.
LaBelle Iron Works, Steubenville, O.
Pittsburg Steel Co., Pittsburg, Pa.
Youngstown Sheet & Tube Co., Youngstown, O.

NUTS.
American Bridge Co. of New York, New York.
American Iron & Steel Mfg. Co., Lebanon, Pa.
Clark Bros. Bolt Co., Milldale, Conn.
Cleveland City Forge & Iron Co., Cleveland, O.
Columbus Bolt Works, Columbus, O.
Garland Nut & Rivet Co., Pittsburg, Pa.
Lockhart Iron & Steel Co., Pittsburg, Pa.
Michigan Bolt & Nut Wks., Detroit, Mich.
Milton Mfg. Co., Milton, Pa.
Oliver Iron & Steel Co., Pittsburg, Pa.
Republic Iron & Steel Co., Chicago, Ill.
Rockford Bolt Co., Rockford, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Steel Car Forge Co., Pittsburg, Pa.
Upson Nut Co., Cleveland, O.

ORE.
(Chrome.)
American Refractories Co., Chicago, Ill.
Blackwell & Sons Co., Ltd., Liverpool, Eng.
Harbison-Walker Refractories Co., Pittsburg, Pa.
Samuel, Frank, Philadelphia, Pa.
Stowe-Fuller Co., Cleveland, O.

ORE.
(Iron.)
Blackwell, Sons & Co., Ltd., Liverpool, Eng.
Breitung, E. N., & Co., Cleveland, O.
Corrigan, McKinney & Co., Cleveland, O.
Debevoise-Anderson Co., New York City.
Hanna, M. A., & Co., Cleveland, O.
Hillman & Son, J. H., Pittsburg, Pa.
LaBelle Iron Works, Steubenville, O.
Lea, J. Tatnall, & Co., Philadelphia, Pa.
Oglebay, Norton & Co., Cleveland, O.
Pickands, Brown & Co., Chicago, Ill.
Pickands, Mather & Co., Cleveland, O.
Snyder & Co., W. P., Pittsburg, Pa.
Tod-Stambaugh Co., Cleveland, O.

OVENS.
Koppers, H., Joliet, Ill.

OVENS.
(By-Products Coke Ovens.)
Koppers, H., Joliet, Ill.
United Coke & Gas Co., The, New York.

OVENS.
(Coke.)
Coal Distillation Co., New York, N. Y.
Koppers, H., Joliet, Ill.

OVENS.
(Coke, Special.)
Covington Machine Co., Covington, Va.

OVENS.
(Coke, with Recovery of By-Products.)
United Coke & Gas Co., New York.

OVENS.
(Core.)
Obermayer, S., Co., Cincinnati, O.

OXYGEN.
American Oxhydric Co., Milwaukee, Wis.
Davis, Bournonville Co., New York City.

PACKING.
Jenkins Bros., New York City.
Shaw-Kendall Engineering Co., Toledo, O.

PACKING.
(Rawhide Hydraulic.)
Chicago Rawhide Mfg. Co., Chicago, Ill.

PANS.
(Grinding.)
Phillips & McLaren Co., Pittsburg, Pa.

PATENTS AND TRADE MARKS.
Thompson & Van Sant, Washington, D. C.

PATTERNS.
Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.
Lake Erie Engineering Works, Buffalo, N. Y.
Ohio National Mfg. Co., Chillicothe, O.
Standard Pattern Works Co., Cleveland, O.
Youngstown Fdy. & Mch. Co., Youngstown, O.

PATTERNS.
(Metal.)
Ohio National Mfg. Co., Chillicothe, O.
Superior Pattern Works, Cleveland, O.

PATTERNS.
(Wood.)
Ohio National Mfg. Co., Chillicothe, O.
Superior Pattern Works, Cleveland, O.

PENSTOCKS.
Struthers-Wells Co., Warren, Pa.
Treadwell Construction Co., Midland, Pa.

PERFORATING.
(Sheet Metal-Automatic, Screen Work.)
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

PILING.
(Steel Sheet Interlocking.)
Cambria Steel Co., Johnstown, Pa.
Carnegie Steel Co., Pittsburg, Pa.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Lackawanna Steel Co., New York City.

PINIONS.
Nuttall, R. D., Co., Pittsburg, Pa.
Van Dorn & Dutton Co., Cleveland, O.

PINIONS.
(Rawhide.)
Chicago Rawhide Mfg. Co., Chicago, Ill.
Ganschow, Wm., Co., Chicago, Ill.
New Process Rawhide Co., Syracuse, N. Y.
Nuttall, R. D., Co., Pittsburg, Pa.

PINS.
(Knuckle and Brake.)
Champion Rivet Co., Cleveland, O.
Oliver Iron & Steel Co., Pittsburg, Pa.

PINS.
(Pivot.)
Champion Rivet Co., Cleveland, O.

PIPE.
Bourne-Fuller Co., Cleveland, O.
Illinois Pipe & Mfg. Co., Chicago, Ill.
LaBelle Iron Works, Steubenville, O.
National Tube Co., Pittsburg, Pa.
Pittsburg Metal Products Co., Pittsburg, Pa.
Pittsburg Valve, Fdy. & Const. Co., Pittsburg.
Riter-Conley Mfg. Co., Pittsburg, Pa.
Struthers-Wells Co., Warren, Pa.
Texas Supply Co., Beaumont, Tex.
U. S. Cast Iron Pipe & Fdy. Co., New York.
Youngstown Sheet & Tube Co., Youngstown, O.

PIPE.
(Riveted Steel.)
American Bridge Co. of New York, New York.
Riter-Conley Mfg. Co., Pittsburg, Pa.
Struthers-Wells Co., Warren, Pa.
Treadwell Construction Co., Midland, Pa.

PIPE.
(Second Hand.)
Foster Co., L. B., Pittsburg, Pa.

PIPE.
(Wrought Iron.)
Bourne-Fuller Co., Cleveland, O.
Central Tube Co., Pittsburg, Pa.
Pittsburg Piping & Equipment Co., Pittsburg.
Pittsburg Valve, Fdy. & Const. Co., Pittsburg.

PIPE WROUGHT.
National Tube Co., Pittsburg, Pa.

PLANERS.
Cincinnati Shaper Co., Cincinnati, O.
Cleveland Punch & Shear Wks Co., Cleveland.
Manning, Maxwell & Moore, Inc., New York.
McCabe, J. J., New York City.
Motch & Merryweather Machy. Co., Cleveland.
Ryerson, Joseph T., & Son, Chicago, Ill.

PLANTS.
(By-Products Coke Ovens.)
Koppers, H., Joliet, Ill.

PLANTS.
(Galvanizing.)
Wilfong Iron Works Co., Philadelphia, Pa.

PLATE.
(Tin.)
American Sheet & Tin Plate Co., Pittsburg, Pa.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Phillips Sheet & Tin Plate Co., Weirton, W. Va.
Standard Tin Plate Co., Canonsburg, Pa.
Taylor, N. & G., Philadelphia, Pa.

PLATES.
American Rolling Mill Co., Middletown, O.
Bourne-Fuller Co., Cleveland, O.
Cambria Steel Co., Johnstown, Pa.
Empire Iron & Steel Co., Niles, O.
Hillman & Son, Pittsburg, Pa.
Illinois Steel Co., Chicago, Ill.
Illinois Steel Warehouse Co., St. Louis, Mo.
Inland Steel Co., Chicago, Ill.
Jones & Laughlin Steel Co., Pittsburg, Pa.
LaBelle Iron Works, Steubenville, O.
Lackawanna Steel Co., New York City.
North Works, Illinois Steel Co., Chicago, Ill.
Otis Steel Co., Cleveland, O.
Pittsburg Metal Products Co., Pittsburg, Pa.
Portsmouth Steel Co, Portsmouth, O.
Republic Iron & Steel Co., Chicago, Ill.
Ryerson, Jos. T. & Son, Chicago, Ill.
Seneca Iron & Steel Co., Buffalo, N. Y.
Taylor, N. & G., Co., Philadelphia, Pa.
Tennessee Coal, Iron & Railroad Co., Pittsburg.
United Steel Co., Canton, O.
Wood, Alan, Iron & Steel Co., Philadelphia, Pa
Worth Bros. Co., Coatesville, Pa.

PLATES.
(Boiler and Tank.)
American Rolling Mill Co., Middletown, O.
Bourne-Fuller Co., Cleveland, O.
Brown-Wales Co., Boston, Mass.
Cambria Steel Co., Johnstown, Pa.
Pittsburg Metal Products Co., Pittsburg, Pa. "Am. Ingot Iron."
Portsmouth Steel Co., Portsmouth, O.
Scully Steel & Iron Co., Chicago, Ill.
Worth Bros. Co., Coatesville, Pa.

PLATES.
(Felloe.)
Wrought Washer Mfg. Co., Milwaukee, Wis.

PLATES.
(Floor.)
Carnegie Steel Co., Pittsburg, Pa.
National Tube Co., Pittsburg, Pa.

WHERE TO BUY

PLATES.
(Sheared.)
Allegheny Steel Co., Pittsburg, Pa.
Bourne-Fuller Co., Cleveland, O.
Carnegie Steel Co., Pittsburg, Pa.
Cincinnati Iron & Steel Co., Cincinnati, O.
Illinois Steel Co., Chicago, Ill.
Portsmouth Steel Co., Portsmouth, O.

PLATES.
(Tie.)
Illinois Steel Co., Chicago, Ill.
Lackawanna Steel Co., New York City.

PLATES.
(Universal.)
Bourne-Fuller Co., Cleveland, O.
Carnegie Steel Co., Pittsburg, Pa.
Illinois Steel Co., Chicago, Ill.
United Steel Co., Canton, O.

PLUMBAGO.
Dixon, Jos., Crucible Co., Jersey City, N. J.
Obermayer, S., Co., Cincinnati, O.
Stevens, F. B., Detroit, Mich.

POINTERS.
(Wire Rod, Wire Mills.)
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

POWER EQUIPMENT.
American Stoker Co., New York, N. Y.

PRESSES.
Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.
Bliss, E. W., Co., Brooklyn, N. Y.
Chambersburg Engrg. Co., Chambersburg, Pa.
Cleveland Punch & Shear Wks. Co., Cleveland.
Dreis & Krump Mfg. Co., Chicago, Ill.
Lake Erie Engineering Works, Buffalo, N. Y.
Mackintosh, Hemphill & Co., Pittsburg, Pa.
Mesta Machine Co., Pittsburg, Pa.
Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., New York City.
Ryerson & Son, Jos. T., Chicago, Ill.
Tod Co., Wm., Youngstown, O.
Toledo Machine & Tool Co., Toledo, O.
United Engineering & Fdy. Co., Pittsburg, Pa.
Waterbury Farrel Fdy. & Mch. Co., Wat'bry, Ct.
Watson-Stillman Co., New York, N. Y.
Wood, R. D., Co., Philadelphia, Pa.

PRESSES.
(Busheling and Cabbaging.)
Famous Mfg. Co., East Chicago, Ind.

PRESSES.
(Drill.)
Townsend, H. P. Mfg. Co., Hartford, Conn.

PRESSES.
(Forging.)
Garrison, A., Foundry Co., Pittsburg, Pa.
Tod Co., Wm., Youngstown, O.
United Engineering & Fdy. Co., Pittsburg, Pa.

PRESSES.
(Hydraulic.)
Tod Co., Wm., Youngstown, O.
United Engineering & Fdy. Co., Pittsburg, Pa.
Watson-Stillman Co., New York, N. Y.

PRESSES.
(Power.)
United Engineering & Fdy. Co., Pittsburg, Pa.

PRESSES.
(Sheet Metal, Scrap.)
Famous Mfg. Co., East Chicago, Ind.

PRESSES.
(Steam, Sleeves, Runner Brick, Nozzles and Tuyeres, Fire Brick Works.)
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

PRESSES.
(Trimming.)
Massillon Fdy. & Mach. Co., Massillon, O.

PRODUCERS.
(Gas.)
Cooper, C. & G., Co., Mt. Vernon, O.
Eynon-Evans Mfg. Co., Philadelphia, Pa.
Hagan, Geo. J., Pittsburg, Pa.
Koppers, H., Joliet, Ill.
Morgan Construction Co., Worcester, Mass.
Struthers-Wells Co., Warren, Pa.
Wellman-Seaver-Morgan Co., Cleveland, O.

PULLEYS.
Jones & Laughlin Steel Co., Pittsburg, Pa.

PUMPS.
Aldrich Pump Dept., Allentown, Pa.
Cameron Steam Pump Wks., New York City.
Chambersburg Engrg. Co., Chambersburg, Pa.
Dean Bros. Steam Pump Wks., Indianapolis.
Deming Co., Salem, O.
Lake Erie Engrg. Works, Buffalo, N. Y.
McGowan, J. H., Co., Cincinnati, O.
Prescott Steam Pump Co., Milwaukee, Wis.
Tod Co., Wm., Youngstown, O.

PUMPS.
(Boiler Feed.)
Cameron Steam Pump Wks., New York City.
Dean Bros. Steam Pump Works, Indianapolis.
Deming Co., Salem, O.
McGowan, J. H., Co., Cincinnati, O.
Prescott Steam Pump Co., Milwaukee, Wis.

PUMPS.
(Electric Driven.)
Dean Bros. Steam Pump Wks., Indianapolis.
Deming Co., Salem, O.

PUMPS.
(Electric and Power.)
Aldrich Pump Dept., Allentown, Pa.
Dean Bros. Steam Pump Wks., Indianapolis.

PUMPS.
(Steam.)
Cameron Steam Pump Wks., New York City.
Dean Bros. Steam Pump Works, Indianapolis.
McGowan, J. H., Co., Cincinnati, O.
Pittsburg Valve, Fdy. & Const. Co., Pittsburg.
Prescott Steam Pump Co., Milwaukee, Wis.

PUMPS.
(Vacuum.)
American Compressor & Pump Co., Baltimore.
Cameron Steam Pump Wks., New York City.
Dean Bros. Steam Pump Wks., Indianapolis.
Mesta Machine Co., Pittsburg, Pa.

PUNCHES AND SHEARS.
Allen, John F., Co., New York City.
Alliance Machine Co., Alliance, O.
Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.
Bliss, E. W., Co., Brooklyn, N. Y.
Cleveland Punch & Shear Wks. Co., Cleveland.
Covington Mch. Co., Covington, Va.
Long & Allstatter Co., Hamilton, O.
Mackintosh, Hemphill & Co., Pittsburg, Pa.
Massillon Fdy. & Mach. Co., Massillon, O.
Mesta Machine Co., Pittsburg, Pa.
Mitts & Merrill, Saginaw, Mich.
Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., New York City.
Ryerson, Joseph T., & Son, Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.
Tod Co., Wm., Youngstown, O.
Toledo Machine & Tool Co., Toledo, O.
United Engineering & Fdy. Co., Pittsburg, Pa.
Wood, R. D., & Co., Philadelphia, Pa.

PUNCHES.
(Hand.)
Bourne-Fuller Co., Cleveland, O.
Henry Pels & Co., New York.

PUNCHES.
(Hydraulic.)
Tod Co., Wm., Youngstown, O.
Watson-Stillman Co., New York, N. Y.

PUNCHES.
(Pneumatic.)
Allen, John F., Co., New York City.

PYROMETERS.
Bristol Co., Waterbury, Conn.
Brown Instrument Co., Philadelphia, Pa.
Stupakoff, S. H., Pittsburg, Pa.

RAILS.
Block Pollak Iron Co., Chicago, Ill.
Bourne-Fuller Co., Cleveland, O.
Buckeye Rolling Mill Co., Steubenville, O.
Cambria Steel Co., Johnstown, Pa.
Carnegie Steel Co., Pittsburg, Pa.
Foster Co., L. B., Pittsburg, Pa.
Illinois Steel Co., Chicago, Ill.
Illinois Steel Warehouse Co., St. Louis, Mo.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Lackawanna Steel Co., New York City.
National Iron & Steel Co., Houston, Tex.
North Works, Illinois Steel Co., Chicago, Ill.
Republic Iron & Steel Co., Pittsburg, Pa.
Richardson & Co., Pittsburg, Pa.
Tennessee Coal, Iron & R. R. Co., Pittsburg.
West Virginia Rail Co., Huntington, W. Va.

RAMMERS.
(Foundry.)
Ingersoll-Rand Co., New York.

REAMERS.
Cleveland Twist Drill Co., Cleveland, O.
Van Dorn & Dutton Co., Cleveland, O.

RECEIVERS.
(Air.)
Ingersoll-Rand Co., New York.

REELS.
(Wood and Iron. Wire Mills.)
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

REGENERATORS.
Coal Distillation Co., New York, N. Y.
Rateau Steam Regenerator Co., New York City.

REGULATORS.
(Boiler Feed Water, Open Feed Water Heater and Pressure.)
Strong, Carlisle & Hammond Co., Cleveland, O.

REGULATORS.
(Speed.)
Cutler-Hammer Mfg. Co., Milwaukee, Wis.

REPAIRING.
Schaeffer Machine Works, Philadelphia, Pa.

RODS.
(Drill, Polished.)
Pittsburg Shafting Co. of Detroit, Detroit, Mich.

RIVETERS.
(Elastic Rotary and High Speed.)
Adt & Son, John, New Haven, Conn.
Shuster Co., F. B., New Haven, Conn.
Townsend, H. P., Mfg. Co., Hartford, Conn.

RIVETERS.
(Hydraulic.)
Chambersburg Engrg. Co., Chambersburg, Pa.
Mackintosh, Hemphill & Co., Pittsburg, Pa.
Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., New York, N. Y.
Wood & Co., R. D., Philadelphia, Pa.

RIVETERS.
(Pneumatic.)
Allen, John F., Co., New York City.
Bliss Co., E. W., Brooklyn, N. Y.
Cleveland Pneumatic Tool Co., Cleveland, O.
Ingersoll-Rand Co., New York.
Ryerson, Joseph T., & Son, Chicago, Ill.

RIVETS.
(Structural, Boiler, Ship.)
American Iron & Steel Mfg. Co., Lebanon, Pa.
Boston Bolt & Iron Co., Boston, Mass.
Bourne-Fuller Co., Cleveland, O.
Champion Rivet Co., Cleveland, O.
Illinois Steel Warehouse Co., St. Louis, Mo.
Garland Nut & Rivet Co., Pittsburg, Pa.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Lockhart Iron & Steel Co., Pittsburg, Pa.
Michigan Bolt & Nut Works, Detroit, Mich.
North Works, Illinois Steel Co., Chicago, Ill.
Oliver Iron & Steel Co., Pittsburg, Pa.
Progressive Mfg. Co., Torrington, Conn.
Republic Iron & Steel Co., Pittsburg, Pa.
Ryerson, Joseph T., & Son, Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.
Steel Car Forge Co., Pittsburg, Pa.
Upson Nut Co., Cleveland, O.

RODS.
(Iron and Steel.)
Amer. Iron & Steel Mfg. Co., Lebanon, Pa.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Republic Iron & Steel Co., Pittsburg, Pa.

ROLLING MILL EQUIPMENT.
Wheeling Mold & Fdy. Co., Wheeling, W. Va.

ROLLS.
(Bending and Straightening.)
Bertsch & Co., Cambridge City, Ind.
Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.
Covington Mch. Co., Covington, Va.
Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., New York City.
United Engineering & Fdy. Co., Pittsburg, Pa.

ROLLS.
(Forged, Galvanizing and Tinning.)
Niles Forge & Mfg. Co., Niles, O.

ROLLS.
(Sand Chilled and Steel.)
Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.
Farrel Fdy. & Mach. Co., Ansonia, Conn.
Garrison Fdy. Co., A., Pittsburg, Pa.
Hyde Park Fdy. & Mch. Co., Hyde Park, Pa.
Mesta Machine Co., Pittsburg, Pa.
National Roll & Fdy. Co., Avonmore, Pa.
Seaman-Sleeth Co., Pittsburg, Pa.
United Engineering & Fdy. Co., Pittsburg, Pa.
Wheeling Mold & Fdy. Co., Wheeling, W. Va.
Youngstown Fdy. & Mch. Co., Youngstown, O.

ROOFING.
(Corrugated.)
American Rolling Mill Co., Middletown, O.
Amer. Sheet & Tin Plate Co., Pittsburg, Pa.
Bourne-Fuller Co., Cleveland, O.
Empire Iron & Steel Co., Niles, O.
Inland Steel Co., Chicago, Ill.
Stark Rolling Mill Co., Canton, O.

ROOFING.
(Iron and Steel.)
Amer. Bridge Co. of New York, New York.
American Rolling Mill Co., Middletown, O.
Amer. Sheet & Tin Plate Co., Pittsburg, Pa.
Bourne-Fuller Co., Cleveland, O.
Empire Iron & Steel Co., Niles, O.
Inland Steel Co., Chicago, Ill.
Newport Rolling Mill Co., Newport, Ky.
Wood, Alan, Iron & Steel Co., Philadelphia.
Youngstown Iron & Steel Co., Youngstown, O.

ROPE.
(Wire.)
American Steel & Wire Co., Chicago, Ill.

RUNWAYS.
(Crane.)
Cleveland Crane & Engrg Co., Wickliffe, O.

SAFES.
York Safe & Lock Co.

SAND BLAST.
Pangborn Co., Thomas W., New York.

SAND BLAST SYSTEMS.
Pangborn, Thomas W., Co., New York.

SAND.
(Molding.)
Garden City Sand Co., Chicago, Ill.
Obermayer, S., Co., Cincinnati, O.
Stevens, F. B., Detroit, Mich.

SATURATORS.
(Ammonia.)
Koppers, H., Joliet, Ill.

SAWS.
(Band.)
Fox Machine Co., Grand Rapids, Mich.

SAWS.
(Cold Metal.)
Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.
Espen-Lucas Machine Works, Philadelphia, Pa.
Newton Mach. Tool Wks., Inc., Philadelphia.
Starrett, L. S., Co., Athol, Mass.

SAWS.
(Hot.)
Mesta Machine Co., Pittsburg, Pa.
United Engrg. & Foundry Co., Pittsburg, Pa.
Wheeling Mold & Fdy. Co., Wheeling, W. Va.

SCREW MCH. PRODUCTS.
Barnes Co., The Wallace, Bristol, Conn.

SCREWS.
Milton Mfg. Co., Milton, Pa.
National Sewing Mch. Co., Belvidere, Ill.
Progressive Mfg. Co., Torrington, Conn.
Republic Iron & Steel Co., Pittsburg, Pa.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Upson Nut Co., Cleveland, O.

WHERE TO BUY

SCREWS.
(Set.)
Allen Mfg. Co., Inc., Hartford, Conn.

SEPARATORS.
(Magnetic.)
Cutler-Hammer Clutch Co., Milwaukee, Wis.

SEPARATORS.
(Steam or Oil.)
American Blower Co., Detroit, Mich.
American Tool & Machine Co., Boston, Mass.
Strong, Carlisle & Hammond Co., Cleveland.

SHAFTING.
American Steel & Wire Co., Chicago, Ill.
Baird Machinery Co., Pittsburg, Pa.
Bourne-Fuller Co., Cleveland, O.
Cincinnati Iron & Steel Co., Cincinnati, O.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Pittsburg Shafting Co. of Detroit, Detroit.
Republic Iron & Steel Co., Pittsburg, Pa.
Standard Gauge Steel Co., Beaver Falls, Pa.

SHAPERS.
Baird Machinery Co., Pittsburg, Pa.
Cincinnati Shaper Co., Cincinnati, O.
Cleveland Punch & Shear Wks Co., Cleveland.
Manning, Maxwell & Moore, Inc., New York.
McCabe, J. J., New York City.
Motch & Merryweather Mach. Co., Cleveland.
Newton Mach. Tool Wks., Inc., Philadelphia, Pa.
Niles-Bement-Pond Co., New York City.

SHAPES.
(Agricultural.)
Carnegie Steel Co., Pittsburg, Pa.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Inland Steel Co., Chicago, Ill.
Republic Iron & Steel Co., Pittsburg, Pa.

SHAPES.
(Special Drawn.)
Pittsburg Shafting Co. of Detroit, Detroit.

SHAPES.
(Steel, Structural and Special Rolled.)
Bourne-Fuller Co., Cleveland, O.
Cambria Steel Co., Johnstown, Pa.
Illinois Steel Co., Chicago, Ill.

SHEARS.
(Angle and Plate.)
Covington Machine Co., Covington, Va.

SHEARS.
(Billet, Bloom and Slab.)
Garrison, A., Foundry Co., Pittsburg, Pa.
Mesta Machine Co., Pittsburg, Pa.
United Engrg. & Fdy. Co., Pittsburg, Pa.
Wheeling Mold & Foundry Co., Pittsburg, Pa.

SHEARS.
(Flying and Bar.)
Morgan Construction Co., Worcester, Mass.

SHEARS.
(Lever.)
Mesta Machine Co., Pittsburg, Pa.
United Engrg. & Fdy. Co., Pittsburg, Pa.
Wheeling Mold & Fdy. Co., Wheeling, W. Va.

SHEARS.
(Scrap, Alligator, Wire and Wire Nail Mills.)
Covington Mch. Co., Covington, Va.
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

SHEARS.
(Squaring.)
Covington Mch. Co., Covington, Va.
Dreis & Krump Mfg. Co., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Garrison, A., Foundry Co., Pittsburg, Pa.
Mesta Machine Co., Pittsburg, Pa.
United Engrg. & Fdy. Co., Pittsburg, Pa.
Wheeling Mold & Fdy. Co., Wheeling, W. Va.

SHEARS.
(Vertical.)
Covington Mch. Co., Covington. Va.
Mesta Machine Co., Pittsburg, Pa.
United Engrg. & Fdy. Co., Pittsburg, Pa.

SHEETS.
(Black Steel.)
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Pittsburg, Pa.
Bourne-Fuller Co., Cleveland, O.
Canton Sheet Steel Co., Canton, O.
Cincinnati Iron & Steel Co., Cincinnati, O.
Empire Iron & Steel Co., Niles, O.
Inland Steel Co., Chicago, Ill.
Newport Rolling Mill Co., Newport, Ky.
Stark Rolling Mill Co., Canton, O.
Youngstown Iron & Steel Co., Youngstown, O.

SHEETS.
(Blue Annealed.)
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Pittsburg.
Bourne-Fuller Co., Cleveland, O.
Inland Steel Co., Chicago, Illl
Portsouth Steel Co., Portsmouth, O.
Stark Rolling Mill Co., Canton, O.

SHEETS.
(Corrugated.)
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Pittsburg.
Bourne-Fuller Co., Cleveland, O.
Empire Iron & Steel Co., Niles, O.
Inland Steel Co., Chicago, Ill.
La Belle Iron Works, Steubenville, O.
Massillon Rolling Mill Co., Massillon, O.
Newport Rolling Mill Co., Newport, Ky.
Seneca Iron & Steel Co., Buffalo, N. Y.
Stark Rolling Mill Co., Canton, O.
Wood, Alan, Iron & Steel Co., Philadelphia.

SHEETS.
(Dead Soft for Stamping.)
American Rolling Mill Co., Middletown, O.
Allegheny Steel Co., Pittsburg, Pa.
American Sheet & Tin Plate Co., Pittsburg.
Canton Sheet Steel Co., Canton, O.
Inland Steel Co., Chicago, Ill.
Phillips Sheet & Tin Plate Co., Weirton, W. Va.
Stark Rolling Mill Co., Canton, O.
Youngstown Iron & Steel Co., Youngstown, O.

SHEETS.
(Deep Drawing Stock.)
Allegheny Steel Co., Pittsburg, Pa.
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Pittsburg, Pa.
Inland Steel Co., Chicago, Ill.
Phillips Sheet & Tin Plate Co., Weirton, W. Va.
Youngstown Iron & Steel Co., Youngstown, O.

SHEETS.
(Galvanized.)
Allegheny Steel Co., Pittsburg, Pa.
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Pittsburg, Pa.
Bourne-Fuller Co., Cleveland, O.
Canton Sheet Steel Co., Canton, O.
Empire Iron & Steel Co., Niles, O.
Inland Steel Co., Chicago, Ill.
La Belle Iron Works, Steubenville, O.
Massillon Rolling Mill Co., Massillon, O.
Newport Rolling Mill Co., Newport, Ky.
Republic Iron & Steel Co., Pittsburg, Pa.
Seneca Iron & Steel Co., Buffalo, N. Y.
Stark Rolling Mill Co., Canton, O.
Wood, Alan, Iron & Steel Co., Philadelphia.
Youngstown Iron & Steel Co., Youngstown, O.
Youngstown Sheet & Tube Co., Youngstown, O.

SHEETS.
(Iron and Steel.)
Allegheny Steel Co., Pittsburg, Pa.
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Pittsburg, Pa.
American Tube & Stamping Co., Bridgeport, Ct.
Bourne-Fuller Co., Cleveland, O.
Canton Sheet Steel Co., Canton, O.
Disston & Sons, Inc., Henry, Philadelphia, Pa.
Empire Iron & Steel Co., Niles, O.
Harvey, Arthur C., & Co., Boston, Mass.
Illinois Steel Co., Chicago, Ill.
Illinois Steel Warehouse Co., St. Louis, Mo.
Inland Steel Co., Chicago, Ill.
La Belle Iron Works, Steubenville, O.
North Works, Illinois Steel Co., Chicago, Ill.
Phillips Sheet & Tin Plate Co., Weirton, W. Va.
Pittsburg Metal Products Co., Pittsburg, Pa.
"Am. Ingot Iron."
Portsmouth Steel Co., Portsmouth, O.
Republic Iron & Steel Co., Pittsburg, Pa.
Scully Steel & Iron Co., Chicago, Ill.
Seneca Iron & Steel Co., Buffalo, N. Y.
Stark Rolling Mill Co., Canton, O.
Taylor, N. & G., Co., Philadelphia, Pa.
Tennessee Coal, Iron & R. R. Co., Pittsburg.
Wood, Alan, Iron & Steel Co., Philadelphia, Pa.
Worth Bros. Co., Coatesville, Pa.
Youngstown Sheet & Tube Co., Youngstown, O.

SHEETS.
(Open-Hearth.)
American Sheet & Tin Plate Co., Pittsburg, Pa.
Inland Steel Co., Chicago, Ill.
Stark Rolling Mill Co., Canton, O.
Youngstown Iron & Steel Co., Youngstown, O.

SHEETS.
(Picked and Cold Rolled.)
American Sheet & Tin Plate Co., Pittsburg.
Canton Sheet Steel Co., Canton, O.

SHEETS.
(Polished.)
American Sheet & Tin Plate Co., Pittsburg.
Canton Sheet Steel Co., Canton, O.

SHEETS.
(Steel Box Annealed.)
American Sheet & Tin Plate Co., Pittsburg.
Canton Sheet Steel Co., Canton, O.

SHOVELS, SPADES AND SCOOPS.
Obermayer, S., Co., Cincinnati, O.

SHOVELS.
(Steam.)
American Locomotive Co., New York, N. Y.
Bucyrus Co., South Milwaukee, Wis.
Thew Automatic Shovel Co., Lorain, O.

SIFTERS.
(Sand.)
Whiting Foundry Equipment Co., Harvey, Ill.

SLABS.
Cambria Steel Co., Johnstown, Pa.
La Belle Iron Works, Steubenville, O.
Lackawanna Steel Co., New York City.
Portsmouth Steel Co., Portsmouth, O.
United Steel Co., Canton, O.

SLABS.
(Sheet.)
Inland Steel Co., Chicago, Ill.
La Belle Iron Works, Steubenville, O.
Tennessee Coal, Iron & R. R. Co., B'm'g'm, Ala.
United Steel Co., Canton, O.
Youngstown Sheet & Tube Co., Youngstown, O.

SMOKE CONDENSERS.
Hawley Down Draft Furnace Co., Chicago.

SMOKE STACKS.
Freeman, S., & Sons Mfg. Co., Racine, Wis.

SOAPSTONE.
Stevens, F. B., Detroit, Mich.

SOLENOIDS.
Cutler-Hammer Clutch Co., Milwaukee, Wis.
Electric Controller & Mfg. Co., Cleveland, O.

SPECIALTIES.
National Tube Co., Pittsburg, Pa.

SPECIALTIES.
(Metal.)
Wire Specialty Works, South Bend, Ind.

SPECIALTIES.
(Steam.)
Cameron Steam Pump Wks., New York City.
Dean Bros. Steam Pump Wks., Indianapolis.
National Tube Co., Pittsburg, Pa.
Strong, Carlisle & Hammond Co., Cleveland.

SPIKES.
American Steel & Wire Co., Chicago, Ill.
Cincinnati Iron & Steel Co., Cincinnati, O.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Republic Iron & Steel Co., Pittsburg, Pa.

SPIKES.
(Screw.)
Illinois Steel Co., Chicago, Ill.
Steel Car Forge Co., Pittsburg, Pa.

SPLICES.
(Rail.)
Carnegie Steel Co., Pittsburg, Pa.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Lackawanna Steel Co., New York City.
Republic Iron & Steel Co., Pittsburg, Pa.

SPRINGS.
Barnes Co., The Wallace, Bristol, Conn.

SPRINGS.
(Vanadium.)
American Vanadium Co., Pittsburg, Pa.

STACKS.
American Bridge Co. of New York, New York.
Meehan Boiler & Constn. Co., Lowellville, O.
Struthers Wells Co., Warren, Pa.
Treadwell Construction Co., Midland, Pa.

STAMPING.
Acklin Stamping Co., Toledo, O.

STAMPING.
(Sheet Metal.)
Acklin Stamping Co., Toledo, O.
Bettcher Mfg. Co., Cleveland, O.
Wire Specialty Works, South Bend, Ind.

STAND-PIPES.
American Bridge Co. of New York, New York.
Treadwell Construction Co., Midland, Pa.

STARTERS.
(Electric Motor.)
Cutler-Hammer Mfg. Co., Milwaukee, Wis.
Electric Controller & Mfg. Co., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., Pittsburg.

STEEL.
American Bridge Co. of New York, New York.
Andrews Steel Co., Newport, Ky.
Bourne-Fuller Co., Cleveland, O.
Cambria Steel Co., Johnstown, Pa.
Carnegie Steel Co., Pittsburg, Pa.
Disston & Sons, Inc., Henry, Philadelphia.
Franklin Steel Co., Franklin, Pa.
Harvey, Arthur C., Co., Boston, Mass.
Illinois Steel Co., Chicago, Ill.
Illinois Steel Warehouse Co., St. Louis, Mo.
Inland Steel Co., Chicago, Ill.
Interstate Iron & Steel Co., Chicago, Ill.
Jones & Laughlin Steel Co., Pittsburg, Pa.
La Belle Iron Works, Steubenville, O.
Lockhart Iron & Steel Co., Pittsburg, Pa.
North Works, Illinois Steel Co., Chicago, Ill.
Otis Steel Co., Ltd., Cleveland, O.
Pittsburg Metal Products Co., Pittsburg, Pa.
"Am. Ingot Iron."
Reliance Steel Casting Co., Pittsburg, Pa.
Republic Iron & Steel Co., Pittsburg, Pa.
Ryerson, Joseph T., & Son, Chicago, Ill.
Tennessee Coal, Iron & R. R. Co., B'm'g'm, Ala.
Wood, Alan, Iron & Steel Co., Philadelphia.

STEEL.
(Autogenous Welding.)
American Oxyhydric Co., The, Milwaukee, Wis.

STEEL.
(Cold Rolled.)
Bourne-Fuller Co., Cleveland, O.
Pittsburg Shafting Co. of Detroit, Detroit.
Ward & Sons, Edgar T., Boston, Mass.

STEEL.
(Cold Drawn.)
Pittsburg Shafting Co. of Detroit, Detroit.
Standard Gauge Steel Co., Beaver Falls, Pa.

STEEL.
(Electric.)
Illinois Steel Co., Chicago, Ill.

STEEL.
(High Speed.)
Vanadium Alloys Steel Co., Latrobe, Pa.

STEEL.
(Open-Hearth.)
Cambria Steel Co., Johnstown, Pa.
Illinois Steel Co., Chicago, Ill.
Portsmouth Steel Co., Portsmouth, O.

STEEL.
(Structural.)
American Bridge Co. of New York, New York.
Bourne-Fuller Co., Cleveland, O.
Cambria Steel Co., Johnstown, Pa.
Carnegie Steel Co., Pittsburg, Pa.

WHERE TO BUY

(STEEL—Continued.)
Empire Iron & Steel Co., Niles, O.
Illinois Steel Co., Chicago, Ill.
Illinois Steel Warehouse Co., St. Louis, Mo.
Inland Steel Co., Chicago, Ill.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Lackawanna Bridge Co., Buffalo, N. Y.
Lackawanna Steel Co., New York City.
McClintic-Marshall Const. Co., Pittsburg, Pa.
North Works, Illinois Steel Co., Chicago, Ill
Republic Iron & Steel Co., Pittsburg, Pa.
Ryerson, Joseph T., & Son, Chicago, Ill.
Worden-Allen Co., Chicago, Ill.

STEEL.
(Squares.)
Franklin Steel Co., Franklin, Pa.

STEEL.
(Tool.)
Bethlehem Steel Co., So. Bethlehem, Pa.
Bourne-Fuller Co., Cleveland, O.
Disston & Sons, Inc., Henry, Philadelphia.
Firth-Sterling Steel Co., McKeesport, Pa.
Goedman, Maurice, New York, N. Y.
Ryerson, Joseph T., & Son, Chicago, Ill.
Vanadium Alloys Steel Co., Latrobe, Pa.
Ward & Sons, Edgar T., Boston, Mass.

STEEL.
(Twisted.)
Franklin Steel Co., Franklin, Pa.

STEEL.
(Vanadium.)
American Vanadium Co., Pittsburg, Pa.
Carnegie Steel Co., Pittsburg, Pa.
United Steel Co., Canton, O.
Vanadium Alloys Steel Co., Latrobe, Pa.

STILLS.
(Ammonia.)
Koppers, H., Joliet, Ill.

STOKERS.
American Stoker Co., New York, N. Y.
Erie Foundry Co., Erie, Pa.

STOKERS.
(Automatic.)
American Stoker Co., New York, N. Y.

STONES.
(Oil.)
Norton Co., Worcester, Mass.

STONES.
(Rubbing and Sharpening.)
Norton Co., Worcester, Mass.

STUDDING.
(Metal.)
Youngstown Iron & Steel Co., Youngstown, O.

SWITCHBOARDS.
General Electric Co., Schenectady, N. Y.

SWITCHES.
(Electrical.)
Cutler-Hammer Mfg. Co., Milwaukee, Wis.
Electric Controller & Mfg. Co., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., Pittsburg.

SWITCHES.
(Magnetic.)
Cutler-Hammer Mfg. Co., Milwaukee, Wis.
Westinghouse Electric & Mfg. Co., Pittsburg.

SWITCHES.
(Snap.)
Cutler-Hammer Mfg. Co., Milwaukee, Wis.

SWITCHES.
(Solenoid.)
Cutler-Hammer Mfg. Co., Milwaukee, Wis.

TABLES.
(Drawing.)
Economy Drawing Table Co., Toledo, O.

TABLES.
(Rolling Mill.)
Morgan Construction Co., Worcester, Mass.

TANKS AND TOWERS.
Freeman, S. & Sons Mfg. Co., Racine, Wis.
Newbold, R. S., & Son Co., Norristown, Pa.
Riter-Conley Mfg. Co., Pittsburg, Pa.
Struthers-Wells Co., Warren, Pa.
Treadwell Construction Co., Midland, Pa.

TANKS.
(Water and Acid Storage, Wire Mills.)
Meehan Boiler & Constn. Co., Lowellville, O.
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

TAR EXTRACTORS.
Koppers, H., Joliet, Ill.

TEETH.
(Steel Harrow.)
Inland Steel Co., Chicago, Ill.

THERMOMETERS.
Brown Instrument Co., Philadelphia, Pa.

TILE.
(Fire Clay, Etc.)
Ashland Fire Brick Co., Ashland, Ky.
Harbison-Walker Refractories Co., Pittsburg.

TILE.
(Locomotive.)
Harbison-Walker Refractories Co., Pittsburg.

TILES AND BLOCKS.
(Furnace.)
Harbison-Walker Refractories Co., Pittsburg, Pa.
Union Mining Co., Mt. Savage, Md.

TOOLS.
(Machinists'.)
Morse Twist Drill & Mch. Co.,
New Bedford, Mass.

TOOLS.
(Molders'.)
Obermayer, S., Co., Cincinnati, O.

TOOLS.
(Pneumatic.)
Cleveland Pneumatic Tool Co., Cleveland, O.
Ingersoll-Rand Co., New York.
Ryerson, Joseph T., & Sons, Chicago, Ill.

TOOLS.
(Thread Cutting.)
Williams Tool Co., Erie, Pa.

TORCHES.
(Shop.)
Dayton Malleable Iron Co., Dayton, O.
Obermayer, S., Co., Cincinnati, O.

TRACK.
(Industrial.)
Atlas Car & Mfg. Co., Cleveland, O.
Chase Foundry & Mfg. Co., Columbus, O.
Industrial Car Co., West Park, O.

TRACK.
(Overhead.)
Brown Hoisting Machinery Co., Cleveland, O.

TRAMRAILS.
(Overhead Systems.)
Brown Hoisting Machinery Co., Cleveland, O.
Northern Engineering Works, Detroit, Mich.
Whiting Foundry Equipment Co., Harvey, Ill.

TRANSMISSION EQUIPMENT.
(Power.)
Jeffrey Mfg. Co., Columbus, O.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Westinghouse Electric & Mfg. Co., Pittsburg.

TRAPS.
(Steam.)
American Blower Co., Detroit, Mich.
Morehead Mfg. Co., Detroit, Mich.
National Tube Co., Pittsburg, Pa.
Strong, Carlisle & Hammond Co., Cleveland.

TRIMMERS.
(Universal.)
Fox Machine Co., Grand Rapids, Mich.

TROLLEYS.
Browning, Victor R., Co., Cleveland, O.
Chisholm & Moore Mfg. Co., Cleveland, O.
Cleveland Crane & Engrg. Co., Wickliffe, O.
National Tube Co., Pittsburg, Pa.
Shepard Electric Crane & Hoist Co.,
Montour Falls, N. Y.

TRUCKS.
Whiting Foundry Equipment Co., Harvey, Ill.

TRUCKS.
(Motor.)
White Co., The, Cleveland, O.

TRUCKS.
(Wire Rod, Wire Mills.)
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

TUBES.
Bourne-Fuller Co., Cleveland, O.
Globe Seamless Steel Tube Co., Chicago, Ill.
Kirby Equipment Co., Chicago, Ill.
National Tube Co., Pittsburg, Pa.
Pittsburg Metal Products Co., Pittsburg, Pa.
"Am. Ingot Iron."
Youngstown Sheet & Tube Co., Youngstown, O.

TUBES.
(Boiler.)
Allegheny Steel Co., Pittsburg, Pa.
Bourne-Fuller Co., Cleveland, O.
Globe Seamless Steel Tube Co., Chicago, Ill.
Kirby Equipment Co., Chicago, Ill.
National Tube Co., Pittsburg, Pa.
Scully Steel & Iron Co., Chicago, Ill.
Worth Bros. Co., Coatesville, Pa.

TUBING.
(Automobile.)
Globe Seamless Steel Tube Co., Chicago, Ill.
Kirby Equipment Co., Chicago, Ill.
National Tube Co., Pittsburg, Pa.
Pittsburg Shafting Co. of Detroit, Detroit.
Youngstown Sheet & Tube Co., Youngstown, O.

TUBING.
(Seamless Steel.)
Globe Seamless Steel Tube Co., Chicago, Ill.
Kirby Equipment Co., Chicago, Ill.
National Tube Co., Pittsburg, Pa.
Pittsburg Shafting Co. of Detroit, Detroit.
Ward & Sons, Edgar T., Boston, Mass.

TUMBLING MILLS.
Northern Engineering Works, Detroit, Mich.
Sly Mfg. Co., W. W., Cleveland, O.

TURBINES.
(Steam.)
Westinghouse Elec. & Mfg. Co., Pittsburg, Pa.

TURNBUCKLES.
Bourne-Fuller Co., Cleveland, O.
Cleveland City Forge & Iron Co., Cleveland.
Merrill Bros., Brooklyn, N. Y.
Michigan Bolt & Nut Wks., Detroit, Mich.
Milton Mfg. Co., Milton, Pa.
Republic Iron & Steel Co., Pittsburg, Pa.
Russell, Burdsall & Ward Bolt & Nut Co.,
Port Chester, N. Y.
Upson Nut Co., Cleveland, O.

TURN TABLES.
Atlas Car & Mfg. Co., Cleveland, O.

TYPEWRITERS.
Typewriters' Distributing Syndicate, Chicago.

UNIONS.
(Pipe.)
Dart, E. M., Mfg. Co., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
(Nokoros.)
National Tube Co., Pittsburg, Pa.

VALVES.
Homestead Valve Mfg. Co., Pittsburg, Pa.
Jenkins Bros., New York City.
McGowan, J. H., Co., Cincinnati, O.
National Tube Co., Pittsburg, Pa.
Pittsburg Piping & Equipment Co., Pittsburg.
Pittsburg Valve, Fdy. & Const. Co., Pittsburg.
Strong, Carlisle & Hammond Co., Cleveland.

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(Back Pressure and Check.)
Jenkins Bros., New York City.
Pittsburg Valve, Fdy. & Const. Co., Pittsburg.

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(Gas and Air Reversing.)
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

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(Hydraulic.)
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Pittsburg Valve, Fdy. & Const. Co., Pittsburg.

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(Reducing.)
Strong, Carlisle & Hammond Co., Cleveland.

VALVES.
(Suction.)
Roberts & Carpenter, Pittsburg, Pa.

VALVES.
(Threeway.)
Pittsburg Valve, Fdy. & Const. Co., Pittsburg.

VANADIUM.
American Vanadium Co., Pittsburg, Pa.

VISES.
Merrill Bros., Brooklyn, N. Y.
Wyman & Gordon Co.,
Cleveland, O., and Worcester, Mass.

WAGON HARDWARE.
Oliver Iron & Steel Co., Pittsburg, Pa.

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Allegheny Steel Co., Pittsburg, Pa.
American Iron & Steel Mfg. Co., Lebanon, Pa.
Barnes Co., The Wallace, Bristol, Conn.
Bettcher Mfg. Co., The, Cleveland, O.
Milton Mfg. Co., Milton, Pa.
Nicetown Plate Washer Co., Philadelphia, Pa
Oliver Iron & Steel Co., Pittsburg, Pa.
Steel Car Forge Co., Pittsburg, Pa.
Upson Nut Co., Cleveland, O.
Wrought Washer Mfg. Co., Milwaukee, Wis.

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(Electric.)
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WELDERS.
(Tire and Axle.)
Long & Allstatter Co., Hamilton, O.

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(Autogenous.)
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WELDING.
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(Oxy-Acetylene Process.)
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(Alundum.)
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WHEELS.
(Grinding.)
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WHEELS.
(Steel Car.)
Carnegie Steel Co., Pittsburg, Pa.

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American Steel & Wire Co., Chicago, Ill.
Bourne-Fuller Co., Cleveland, O.
Cambria Steel Co., Johnstown, Pa.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Pittsburg Steel Co., Pittsburg, Pa.
Ward & Sons, Edgar T., Boston, Mass.

WIRE.
(Cable and Rope.)
American Steel & Wire Co., Chicago, Ill.
Pittsburg Steel Co., Pittsburg, Pa.

WIRE.
(Grilles.)
American Steel & Wire Co., Chicago, Ill.
Bourne-Fuller Co., Cleveland, O.

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(Threaded.)
Progressive Mfg. Co., Torrington, Conn.

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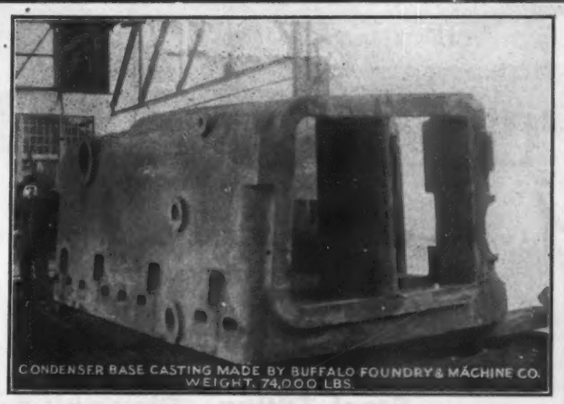
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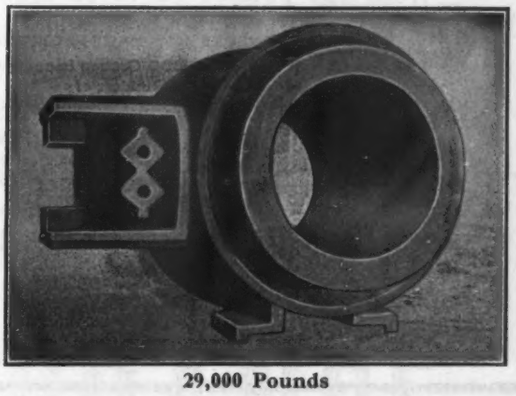
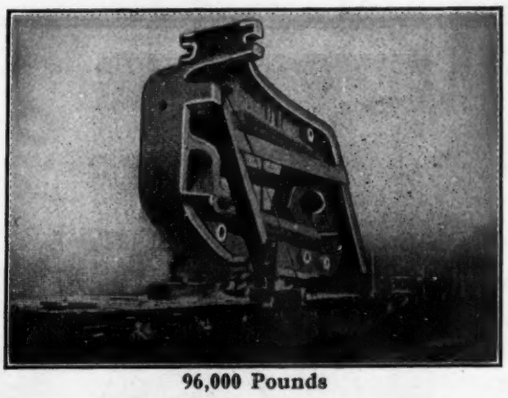

29,000 Pounds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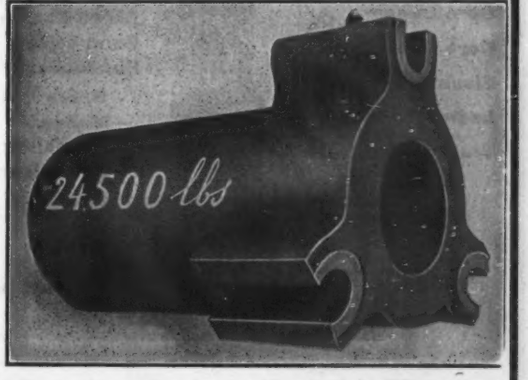

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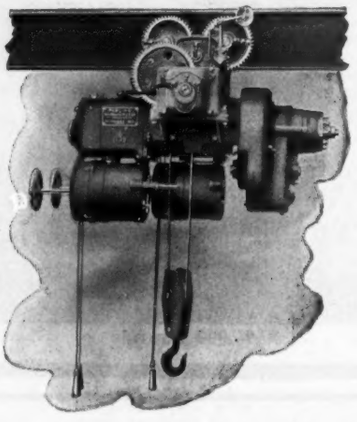

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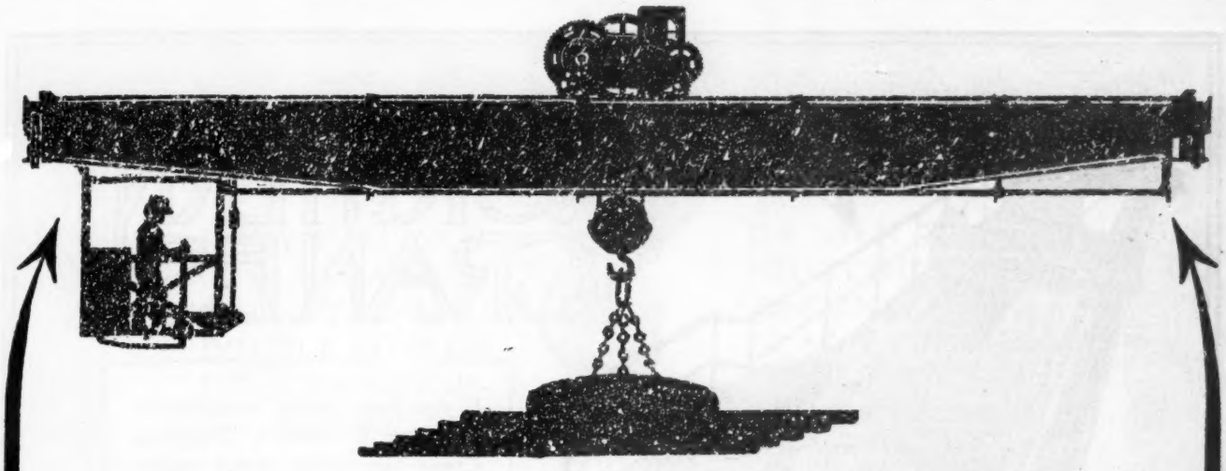

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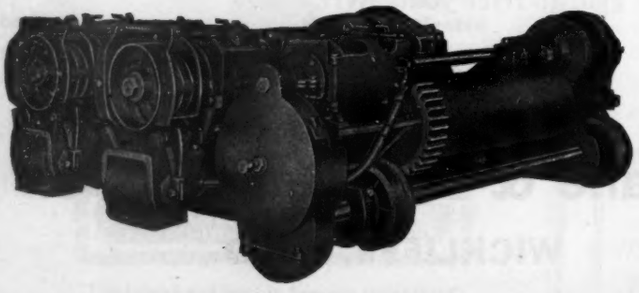

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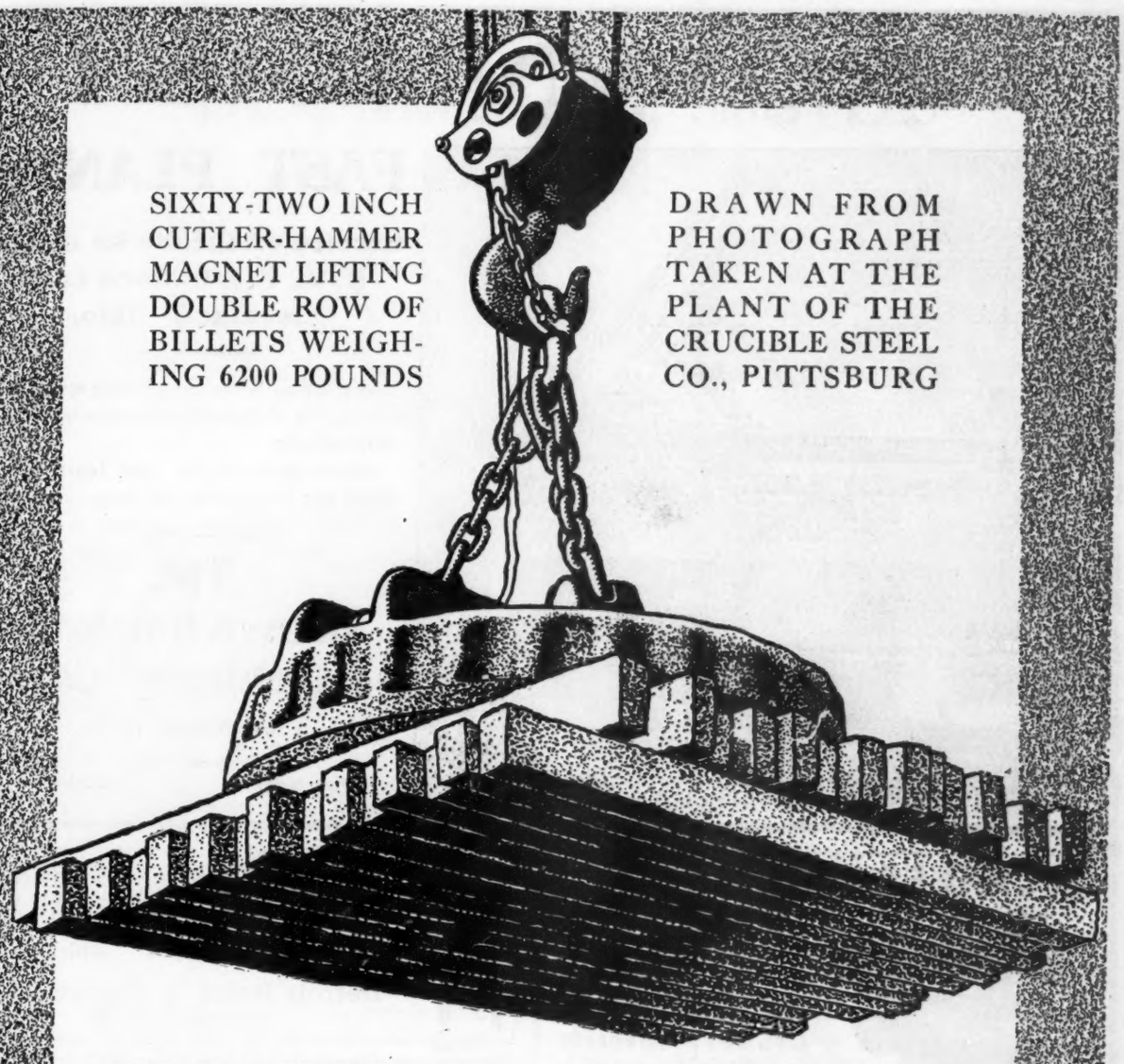

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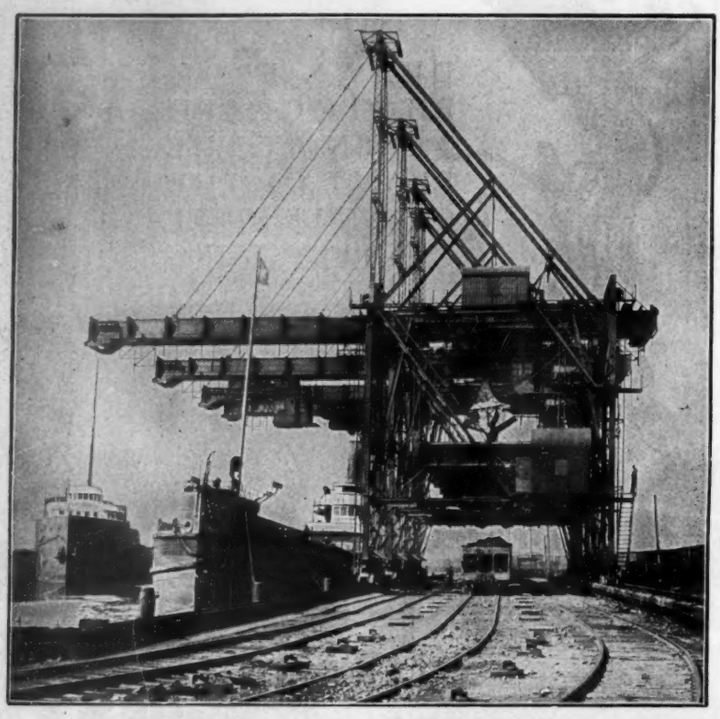

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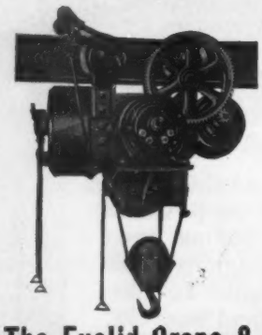

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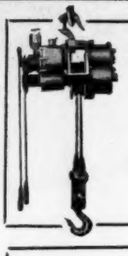

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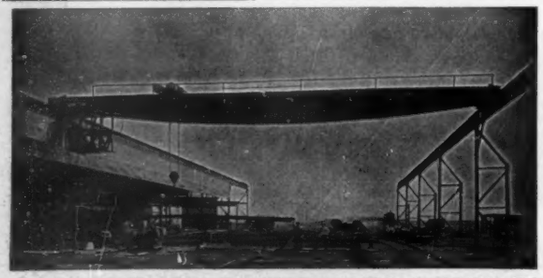

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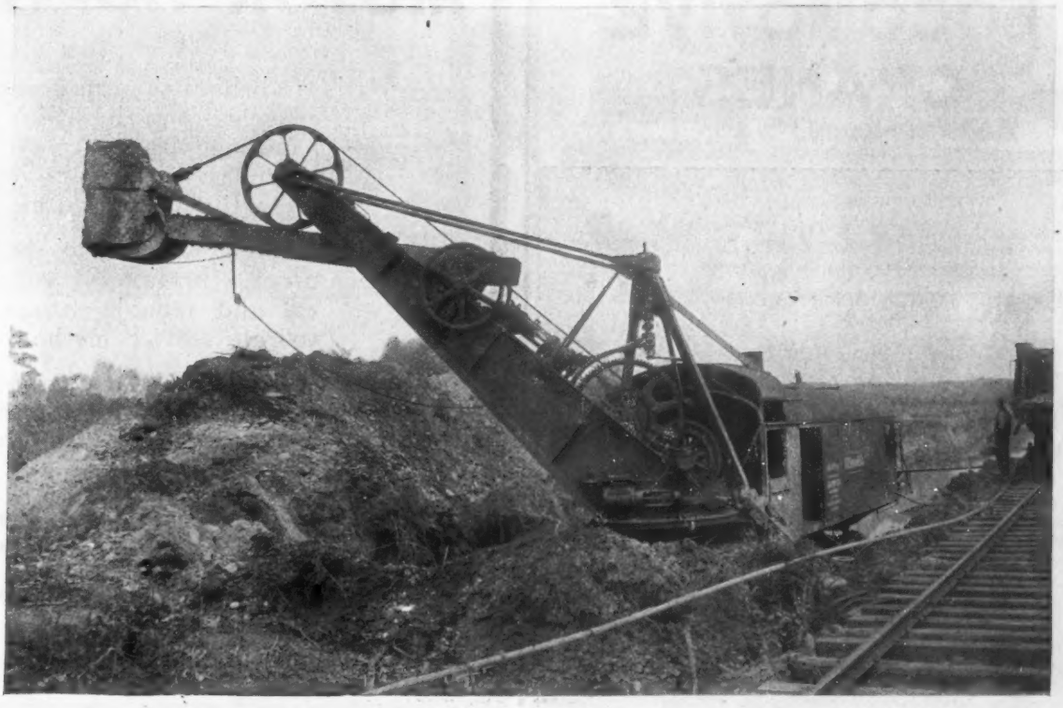

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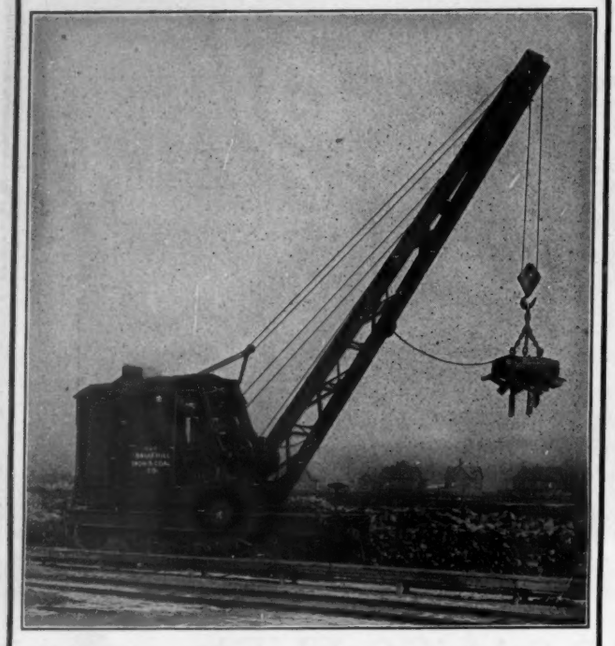

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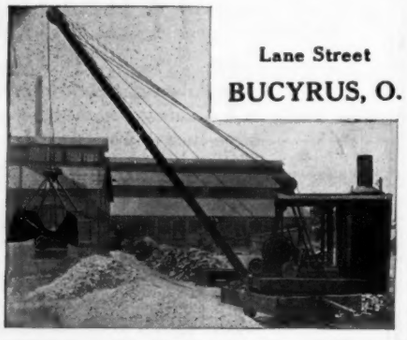

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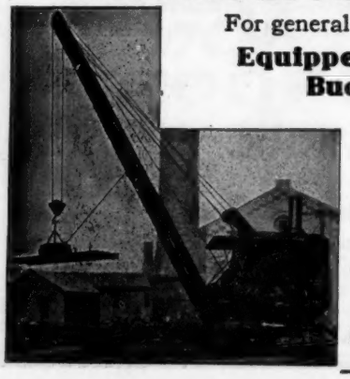

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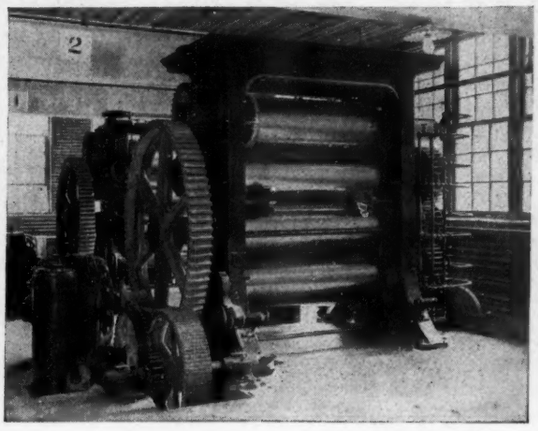

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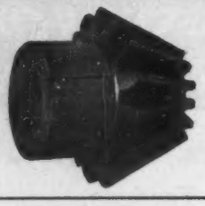

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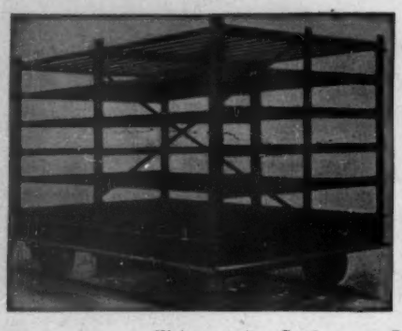

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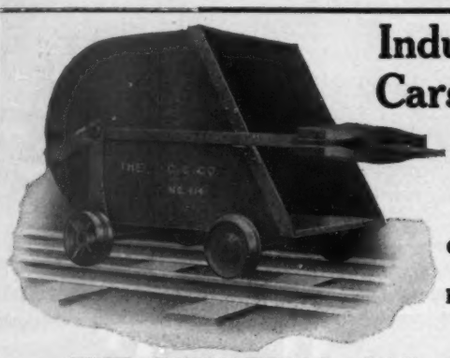

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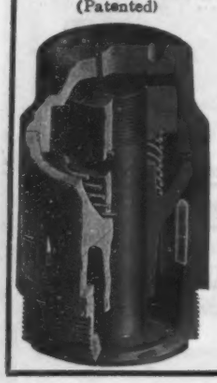

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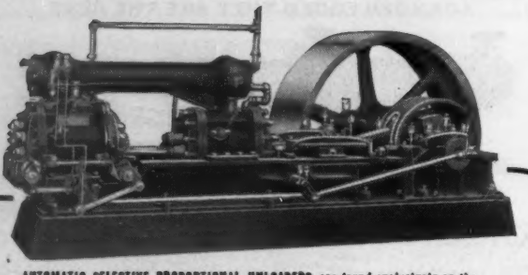

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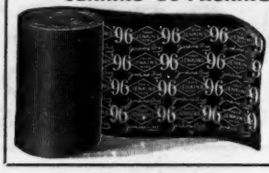

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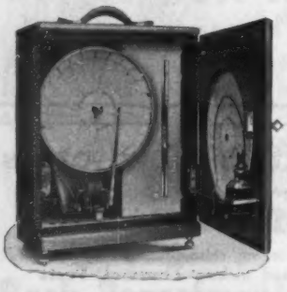

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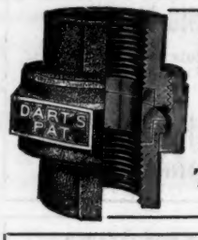

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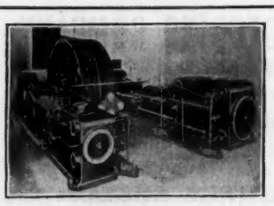

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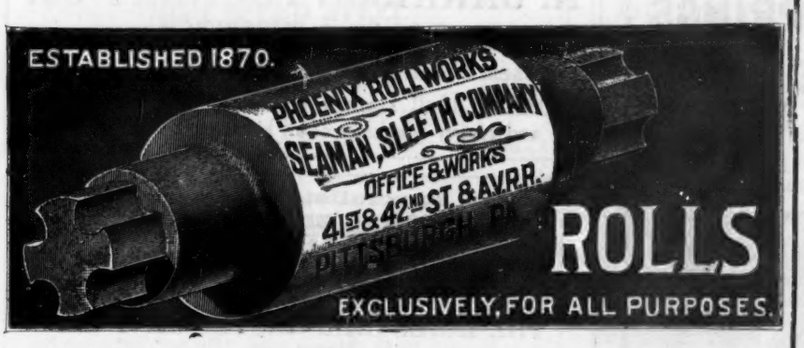

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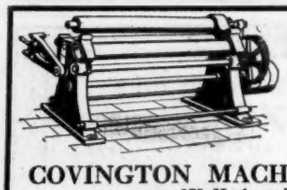
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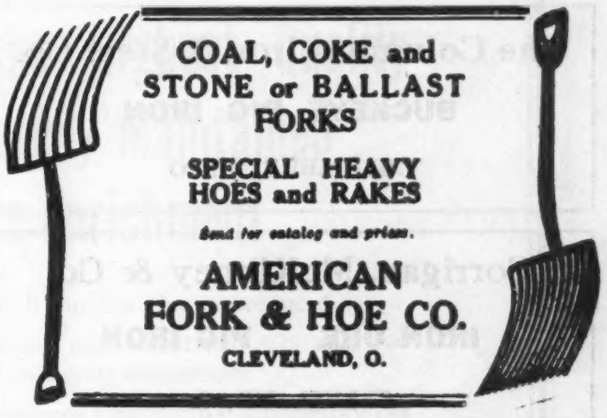

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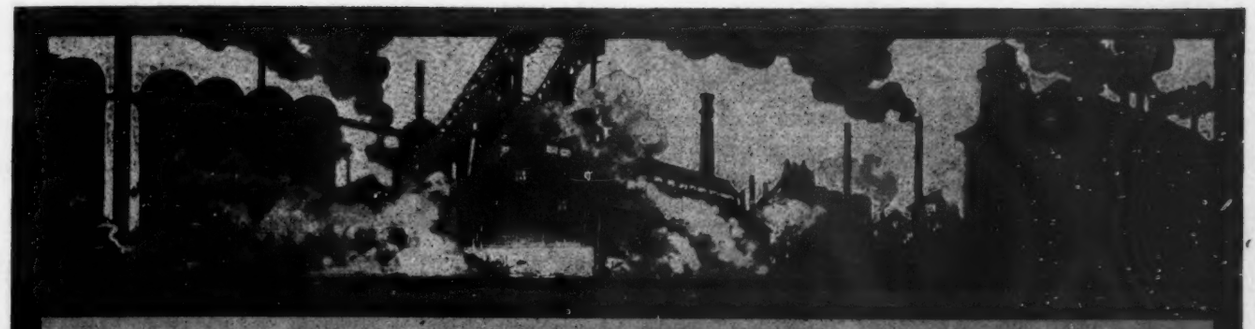

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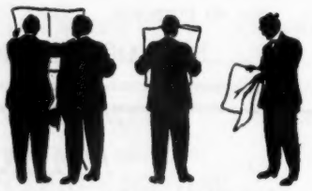

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WANTED—FOUNDRY FOREMAN, EXperienced on machinery castings and general jobbing work. Must have thorough knowledge of cupola and foundry practice; up-to-date in every respect; able to handle men and get results, and familiar with use of molding machines. Good salary to a high grade man. State age, whether married, firms by which employed as foreman, length of service with each and salary desired. Address Box 88, THE IRON TRADE REVIEW, Cleveland, O.

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POSITION WANTED AS FOUNDRY foreman in malleable or gray iron foundry, up-to-date in foundry practice, 28 years' experience, married, strictly temperate, experienced on molding machines, open shop preferred. Address Box 29, THE IRON TRADE REVIEW, Cleveland, O.

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FOR SALE.—FOUNDRY AND MAchine shop in western Illinois, doing good business in structural iron and general castings. Owner wishes to retire. Address Box 150, THE IRON TRADE REVIEW, Cleveland, O.

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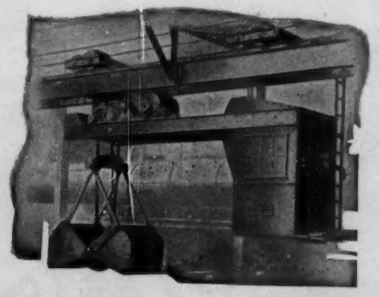

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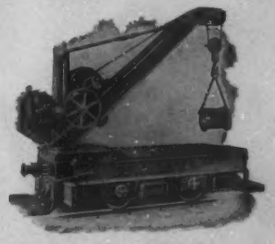

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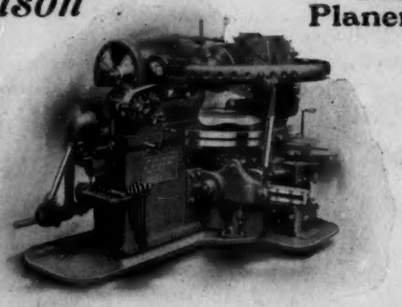

18" Bevel Gear Generator

THIS machine operates with a pair of cutting tools which finish opposite sides of the same tooth, and while one tool is on the forward stroke, the other is on the reverse. This plan doubles the speed of cutting, balances the thrust of the cut and minimizes the vibration. It also avoids the interference of the tools likely to occur near the apex of long face gears, if working in the same direction at the same time.

The cutting sides of these tools represent adjacent teeth on a crown gear of the same pitch as the tooth being planed, and the tools and the blank roll together in the relation of a crown gear mating with a pinion. The tools travel on converging lines, the angle between which is such, that if the lines were prolonged, they would meet at the cone center of the machine.

The advantage of the machine besides the accuracy it gives of tooth contour, is its large output on fine pitch gears, due to the two tools working simultaneously, and the high speed at which they cut.

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